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Economic Behaviour and Fairness Perceptions: A Microeconomic Analysis

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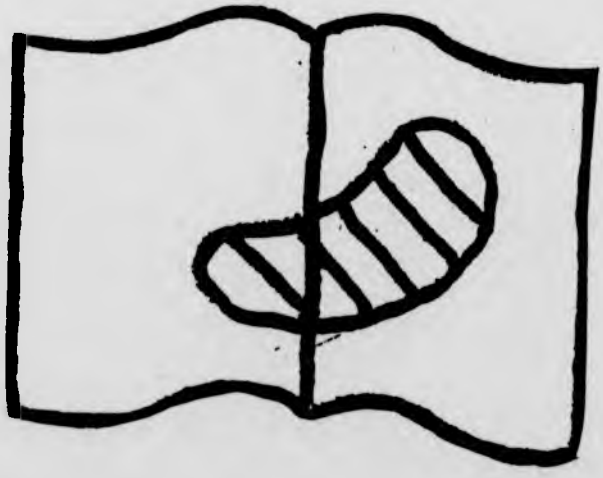

This thesis is dedicated to my parents.

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Declaration

I declare that this thesis is entirely my own work. I also confirm that this thesis has not been submitted for a degree at any other university.

Abstract

This thesis is primarily concerned with the microeconomic implications of fairness considerations. It contributes to the existing literature by providing new insights into the behavioural consequences of fairness perceptions and it continues to challenge conventional wisdom by presenting further evidence that indicate that fairness considerations affect marginal choices.

Chapter 1 introduces the thesis and provides a summary of the subsequent chapters and a description of the data employed.

Chapter 2 presents the first known empirical analysis of the determinants of the fairness-of-pay perceptions for employees in the United Kingdom. Interestingly, the findings reveal that demographic characteristics significantly influence individuals' perceptions of how fairly they are paid. This suggests that to successfully tackle pay discrimination, it is not enough to concentrate only on wages. Policies should also target cultural and other institutional factors.

Chapter 3 uses both theory and evidence to explore the relationship between fairness perceptions of the wealth distribution and hours of work. It is the first study known at this time to carry out such an investigation. The empirical analysis uncovers a strong positive relationship between hours of work and fairness perceptions of the wealth distribution. It is proposed that as the wealth distribution becomes more unfair, there is a greater need for voluntary work. As a result, individuals increase the time spent on voluntary activities at the expense of labour market work. This relationship suggests that an unfair wealth distribution can have adverse effects on economic activity.

Chapter 4 examines the link between private savings and fairness perceptions of the wealth distribution. At this time, it the first study known to do so. Based on a simple theoretical model, the empirical analysis reveals that savings and fairness perceptions of the wealth distribution are, on the whole, positively related. It is argued that an unfair wealth distribution encourages individuals to reduce savings and engage in conspicuous consumption as they seek to improve their economic status. Given the importance of savings for future consumption and growth, it is useful for policymakers to be aware of this link.

Chapter 5 concludes and proposes directions for future research.

Chapter 1

Introduction

1.1 Overview and context

> "The idea that economists should incorporate behavioural evidence from psychology and elsewhere that indicate systematic and important departures from our discipline's habitual assumptions is so fundamentally and manifestly good economics that I am confident it will have long-term influence in economics." Rabin (2002), *European Economic Review* 46, pg.658

Economics is often regarded as the most successful of the social sciences as it is able to generate powerful and dependable predictions from simple but rigorous models of individual behaviour. However, it has become increasingly apparent that the traditional models, with the characteristic narrow conception of the individual as being solely a selfish rational agent, are lacking as they are not always able to explain important and persistent observed behaviour.

As social beings, individuals are not simply led by egoist instincts but are also guided by social norms that at times prescribe behaviour that pulls in the opposite direction to that implied by pure self-interestedness. This is a reality too often neglected by the standard model. According to popular social psychology reasoning, deviations from social norms may give rise to cognitive dissonance, which induces individuals to act in ways that are aimed at reducing this conflict

but which do not necessarily maximise pecuniary gains. For instance, individuals care about fairness and this motivates them to engage in altruistic or retaliatory acts that may be costly to them. This is notably evident in ultimatum games where, contrary to the standard model, individuals reject positive offers to punish those who behave unfairly. By not paying enough attention to this dimension of *homo economicus*, the standard model runs the risk of not being able to recommend adequate policies to successfully direct economic behaviour.

Concerns about the limitation of the standard model have, in recent years, fuelled the drive towards incorporating the findings of other disciplines into economic analyses. The main proposition underlying these findings is that, contrary to traditional assumptions, non-pecuniary concerns affect economic behaviour in non-trivial ways. Of these, the implications of fairness concerns have perhaps been the most widely examined.

Existing theoretical and empirical evidence persuasively demonstrates that fairness considerations have important consequences for economic outcomes such as unemployment, profit maximisation incentives and public good provision. This means that fairness considerations enter the utility function and have a non-negligible impact on marginal choices. They may enter the utility function directly, in that, individuals care about fairness for itself and gain pleasure from its existence and from behaviour that serves to enforce it. Fairness and fairness-

increasing behaviour give rise to cognitive consonance and pleasure inducing emotions. Similarly, individuals derive displeasure when fairness is violated insofar as they experience cognitive dissonance and other visceral emotions such as anger and guilt. Fairness considerations may also enter the utility function indirectly as it may affect behavioural motives such as status seeking, willingness to cooperate and insecurity.

A well-known example, which shows how fairness considerations affect marginal decisions, is that of effort choice. Research has shown that the amount of effort offered by individuals is determined not just by wages but perhaps more importantly by their perceptions of how fair their wages are (see for example, Adams (1963) and Fehr *et al* (1993) *inter alia*). The evidence that fairness consideration impacts on marginal choices have brought about a growth in studies in that area and has led some economists to conclude that:

> "Economists who once would have assumed without hesitation that agents are purely self-interested now entertain seriously the suggestion that observed behavior may reflect such considerations as altruism, fairness, reciprocity, retaliation, and spitefulness." Manski (2002), *European Economic Review* 46, pg.880

In addition, some of these studies prove that by integrating fairness concerns

into economic modelling, economists can still generate the standard economic predictions as well as explain many behavioural anomalies that represent departures from what would normally be derived from the standard model. Indeed, it can be argued that the inclusion of fairness concerns in economic analyses has led to a richer understanding of the dynamics behind economic outcomes.

Nonetheless, the empirical analysis of the impact of fairness considerations on economic behaviour is hindered by the paucity of appropriate data. Currently, data capturing individuals' fairness perceptions of economic outcomes are notably scarce. This problem is compounded by economists' suspicion vis-à-vis the reliability of subjective data. It is argued that subjective data are unreliable as individuals are not very forthcoming when asked about their personal opinions and also that opinions are sensitive to changes in situational factors such as mood and the environment. This is made more challenging as there are no objectives scales to rely on. However, this objection to using subjective data is arguably flawed for there is no clear and convincing reason to suppose that an individual is more truthful or less liable to make mistakes when reporting objective information such as, for example, income than when reporting his perceptions of economic matters. Moreover, intuition suggests that subjective data may at times be more suitable than supposedly objective data. Indeed, it seems reasonable to expect that it is often individuals' perceptions of an outcome that are likely to inform their behaviour

rather than some assumed measure of the outcome.

This highlights an obvious danger to disregarding subjective data. The assumed objective measures may not necessarily be consistent with individuals' perceptions and this can result in misleading predictions. For instance, in the case of discrimination, if individuals do not perceive that they are unfairly treated, they will not be motivated to adjust their behaviour in order to help forge fairer treatment. Therefore, ignoring that fact and relying instead on some statistical measure of discrimination can lead to erroneous policies that do not go very far in reducing discrimination. In short, to create effective policies, it is necessary to not only include non-pecuniary concerns in empirical analyses but data that aptly capture these concerns must also be employed.

A survey of the literature reveals that the majority of the empirical evidence on the impact of fairness considerations on individuals' economic decision-making has been largely experimental and there remains a need for more non-experimental analyses. This is especially needed to deal with the usual criticism that with experimental analyses it is difficult to both simulate a 'real world' environment and to control for the unwanted effects of the artificial nature of the environment.

Using robust regression analysis this thesis aims to contribute to a fuller understanding of individual behaviour in the economic sphere by providing new insights

into the implications of fairness perceptions as a behavioural motive. As such, it hopes to lend further support to the move towards giving greater weight to non-traditional behavioural motives in the analysis of economic outcomes.

1.2 Thesis structure

How fairly resources are allocated in society, notably in the labour market, is a major economic and political issue for governments and some, as in the case of the Labour Party in the United Kingdom, have made the fight against unfairness a central theme in their election campaign. Redistributive policies and anti-discriminatory policies are designed to achieve outcomes that appeal to people's perceptions of fairness. Presumably, this is because governments recognise that individuals' behaviour are affected by their fairness perceptions.

This thesis proceeds on the premise that fairness considerations have consequences for marginal choices and presents further instances of this by focusing on the behavioural implications of achieving or not achieving a fair society. The thesis is both theoretical and empirical. It examines the determinants of the fairness-of-pay perceptions of individuals and investigates how perceptions of the fairness of the wealth distribution affect individuals' hours of work and savings decisions.

Of the studies that explore the impact of fairness considerations on economic

behaviour most concentrate on the labour market. Chapter 2 and Chapter 3 of the thesis follow this custom. Chapter 2 looks at the factors that influence individuals' fairness perceptions of their pay while Chapter 3 investigates how labour supply choice is affected by fairness perceptions of the wealth distribution. Both chapters focus on individuals who are employees.

Similar to Chapter 3, Chapter 4 addresses the role of fairness perceptions in shaping economic behaviour. It presents a study of the relationship between savings and fairness perceptions of the wealth distribution. As in the case of the other chapters, the empirical analysis concentrates on employees.

The final chapter summarises the main results of the thesis and suggests further areas for research.

1.3 An outline of the main chapters

1.3.1 A Cross-section Analysis of the Fairness-of-pay Perception of UK Employees

Policies aimed at tackling pay discrimination implicitly assume that individuals are aware that they are unfairly treated. Indeed, success in reducing discrimination crucially depends on those who are adversely affected being cognisant of the dis-

crimination. If they do not perceive themselves to be unfairly treated, the policies are unlikely to achieve the desired results since the necessary motive is absent.

Surprisingly, little has been done to determine whether those individuals who are most likely to face pay discrimination are aware of the bias against them. The few relevant studies that exist have examined this issue for only specific occupations in the United States and apparently none has explored this issue for the United Kingdom. This chapter attempts to fill this gap. It provides an insight into this issue for the United Kingdom and does not restrict attention to any one occupation.

Using data from the British Social Attitudes Survey, the chapter estimates the first known fairness-of-pay perception equations for employees in the United Kingdom. It seeks to ascertain whether individuals' perceptions of the fairness of their pay are consistent with established labour market theories. This is an important inquiry. For, insofar as fairness concerns affect marginal choices, it is essential to understand what factors shape these perceptions of fairness. Particular emphasis is placed on demographic characteristics – gender, ethnicity, and age. The effect of a comparison wage is also looked at. Given the cross-sectional nature of the data, several robustness checks are conducted to ensure the validity of the results.

1.3.2 Does the Fairness of the Distribution of Wealth Affect Individual Labour Supply?

Labour supply has implications for the standard of living in a country. For a given labour productivity level, an increase in the total number of hours worked will lead, *ceteris paribus*, to a higher Gross Domestic Product. Consequently, identifying the factors that meaningfully affect hours of work is of importance for policy makers.

The chapter undertakes a theoretical and empirical analysis of the relationship between perceptions of the fairness of the wealth distribution and hours of work. It is apparently the only study known at this time to explore this relationship. In the first part, a simple theoretical model is constructed to illustrate how the fairness of the wealth distribution might affect individuals' labour supply choice. Individuals' total time is assumed to be a trichotomy of leisure time, time spent on labour market work, and time spent on voluntary work. It proposes that when a social norm such as fairness is violated, individuals respond in ways that serve to reduce the unfairness. The manner in which they choose to respond may have consequences for the way in which they divide their time. For example, if in order to help reduce unfairness in society individuals engage in voluntary activities, it is possible that this may be at the expense of labour market work.

Using panel data from the British Household Panel Survey, the second part

of the chapter conducts an empirical analysis to determine the nature of the relationship between labour supply and individuals' perceptions of the fairness of the wealth distribution. Various tests are performed to verify the stability of the results.

1.3.3 Perceived Fairness of the Wealth Distribution and Private Savings: Evidence From Micro Data

Another important issue that occupies policy makers is the level of savings. At present, the United Kingdom, like many other OECD countries, is experiencing a low savings ratio. This is of concern. The future health of an economy depends on the level of savings. The same is true for the future economic well-being of an individual. Savings are needed to fund future investments, which are vital for growth and to finance future consumption of individuals particularly during retirement years. It is therefore important to understand the factors that affect the amount that individuals choose to save.

Data on individuals' motives for saving are rare and by virtue of their nature, motives themselves cannot be easily measured. For example, how does one measure the bequest or independence motives for saving? Though some studies do seek to construct measures of such motives, these measures are often arbitrary with no

guarantee that they adequately capture these motives. Consequently, as in the investigation of other empirical relationships, economists must rely on factors that embody these intervening variables.

Of course, there are a plethora of such factors. However, there are some that appear not to receive much coverage in the literature. These are those which represent the (macro) economic environment. This final chapter is interested in one such factor – the fairness of the wealth distribution.

Based on a simple theoretical framework in which saving is defined as income less consumption, the chapter employs the British Household Panel Survey data set to investigate the relationship between the amount an individual saves and his fairness perceptions of the wealth distribution. It argues that how fairly wealth is distributed in a country may have implications for individuals' motivations to save. For instance, it may induce them to be more or less competitive or it may give rise to greater or less insecurity about the future. These offer an intuition as to why individuals' savings may be influenced by how fairly wealth is distributed.

Note that there is nothing new in the idea that the wealth distribution plays a role in determining savings behaviour. However, none of the existing studies is known to have carried out a regression analysis of this relationship at the micro level. Indeed, this chapter appears to be the first to do so. An added novelty is

that individuals' perceptions are used rather than a constructed measure of the distribution of wealth.

1.4 Data sources

Finding large data sets that allow empirical investigations on the behaviouristic role of fairness in economics can be difficult. Most of the existing studies employ small-scale data sets and often analysis is restricted to specific occupations or groups of individuals. The data sets used in this thesis does not face such limitations.

In Chapter 2, the British Social Attitudes survey data set is used. It is a yearly cross-sectional survey which began in 1983. It samples approximately 3,600 individuals aged 16 and over who reside in the United Kingdom. The survey is dedicated to the gathering of attitudinal information to enable researchers to analyse the degree of changes and continuity in opinions on social, economic, political and moral issues and the consequent impact of these on economic behaviour.

The British Household Panel Survey data set forms the backbone of Chapter 3 and Chapter 4. It is a national representative household-based survey, which began in 1991. It covers over 5,000 households in the United Kingdom and involves approximately 10,000 individual interviews. At the time of the interviews, individuals are either aged 16 or over. Like the British Social Attitudes survey, the

British Household Panel Survey gathers a wide range of information on individuals' opinions concerning social, economic, political and moral issues. Given its panel element, it provides the opportunity to control for individual characteristics, which can be worrisome for studies using cross-section data. This aspect of the data is decidedly valuable in the empirical analyses carried out in these two chapters.

In addition to the benefits of rich information on individuals' characteristics, these data sets also contain useful information on their fairness opinions. It is for this reason that the data used here are an integral part of the thesis. The data sets and corresponding documentation can be obtained from the UK Data Archive.

Chapter 2

A Cross-section Analysis of the Fairness-of-pay Perceptions of UK Employees

2.1 Abstract

Using cross-section data from the British Social Attitudes Survey, this paper contributes to the understanding of individuals' fairness perceptions by estimating what seems to be the first fairness perceptions-of-pay equations for Britain. The results suggest that, consistent with the existence of discrimination in the labour market, non-white workers perceive their pay as disadvantageously unfair. In contrast, and rather surprising, it is found that female employees have more favourable fairness-of-pay perceptions than male employees. There is some evidence that with age, workers feel less fairly paid. Therefore, findings reveal that demographic characteristics matter and consequently, tackling pay alone may not eliminate feelings of underpayment.

Key words: Fairness perception; pay

JEL Classification: C21; C23; C25; J28; J71; Z13;

2.2 Introduction

Fairness has mainly been used in economics in an objective sense to describe an outcome. As a subjective evaluation, its role in generating outcomes has only recently been acknowledged though its value in shaping individual behaviour has long been advanced in the other social sciences. Certainly, as a social being, an individual's behaviour is likely to be affected by societal factors of which fairness perceptions are a part[1].

The implication that fairness considerations are an ever-present feature of economic exchanges, operating alongside the maximisation of pecuniary gains, is substantiated by results from social psychology experiments, ultimatum games, and reciprocity experiments (see Andrews (1967), Rabin (1993), Fehr et al (1997) and Clark and Sefton (2001) *inter alia*). The main tenet of these results is aptly summarised by Adams (1965) who states "men do not simply become dissatisfied with conditions they perceive to be unjust. They usually do something about them"[2].

[1]Some neurological studies (see for example LeDoux (1996)) argue that emotions are sometimes a better guide to action than rational thought processes. Indeed, fairness concerns may give rise to emotions that are not consistent with economists' conception of the rational economic agent. This is often seen in ultimatum games where individuals reject positive offers.

[2]Adams, J.S (1965), 'Inequity in Social Exchange' in Advances in Experimental Social Psy-

Simply put, fairness concerns have behavioural implications.

When the evidence that fairness is a valued good is taken into consideration, it becomes possible to make sense of the many market 'anomalies' that are not adequately accounted for by the standard model[3] such as the rejection of positive offers in ultimatum games, voluntary contribution to public goods and involuntary unemployment (see for example Isaacs *et al* (1985), Dawes and Thaler (1988), Akerlof and Yellen (1990), and Fehr *et al* (1993), Fehr and Gächter (2000)). So, given the likely prevalence of fairness considerations and insofar as agents act on their perceptions, fairness as a behavioural motive may not be an epiphenomenon as traditional economists contend.

Of the studies that have explored the role of fairness considerations in shaping individual behaviour, only two are known to have examined the determinants of pay perceptions for non-hypothetical individuals[4]. Hampton and Heywood (1993)

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chology, L. Berkowitz (ed.), Vol. 2, New York: Academic Press. Pg. 276.

[3]The standard model here refers to the model in which the modus operandi of the individual is that of selfish maximisation of pecuniary gains.

[4]Alves and Rossi (1978) and Shepelak and Alwin (1986) both studied how the characteristics of computer generated households entered in respondents' judgement of how fair they perceive the income of these (hypothetical) households to be.

used data for a single cross-section to study how the standard statistical measure of the gender pay gap matches individuals' perceptions of underpayment. This involved estimating separate perception of adequate income equations for young male and female physicians in the United States. The same analysis was performed in their companion paper Hampton and Heywood (1999) for the pay gap between white physicians and physicians from ethnic minorities. The findings revealed that adequacy perceptions of income are influenced by actual wage discrimination as well as individual characteristics such as age and marital status. Similarly, using repeated cross-section data, which could be considered an improvement vis-à-vis the studies by Hampton and Heywood (1993, 1999), Verhoogen *et al* (2002)[5] looked at wage-fairness perception equations for individuals employed by a single national unionised trucking firm. They found that the relative wage (measured as the gap between within-firm wage and a predicted expected outside wage) and the unemployment rate are the main determinants of wage-fairness perceptions. Together, these studies suggest that pay perceptions depend on more than a simple comparison of own pay with that of a reference other as implied by the social psychology literature. In this respect, they help provide a better understanding of the relationship between an individual's pay and his labour market behaviour.

[5]It should be pointed out that their study was published soon after the first draft of this paper was completed.

However, they both concentrated only on US workers in a single occupation and as such the conclusions from their findings are limited.

Therefore, as a contribution to the literature, this paper focuses on the fairness perceptions of pay for British workers and rather than restricting the analysis to a single occupation, a wider employee population is considered. As such, the findings here could be regarded as being more generalised than that of the previous studies. Important in this contribution is the use of attitudinal data, which are sourced from the British Social Attitudes Survey (BSA). This data set facilitates the first ever known estimation of fairness perception equations for Britain. The basic objective is to explain the evidence in the BSA survey, which show that 36.89 percent of employees perceive their pay as unfairly low and 7.71 percent perceive their pay as unfairly high, an outcome that violates the fundamental welfare theorems and deviates from standard theoretical predictions[6]. Moreover, the link between an individuals' fairness-of-pay perceptions and his effort attest to the importance of analysing the determinants of fairness-of-pay perceptions. The

[6]Assuming as is done in the social psychology literature that individuals prefer a fair outcome to an unfair one, it is possible to make both an individual who feels his pay is too low and one who thinks his pay is too high, better off. By redistributing some of the rewards of the individual who perceive his pay as too high to the other who thinks it to be too low a Pareto improvement can be achieved.

perceptions of women and ethnic minorities are considered against the backdrop of discrimination in the labour market. Likewise, the relationship between fairness perceptions and age and fairness perception and comparison wage are looked at in relation to the negative correlation suggested in both cases by theory and evidence.

At this juncture, it is necessary to stress that perceptions of the fairness of pay are not equivalent to expressions of satisfaction of pay, for it is possible that an individual is (completely) satisfied with his pay but yet think it to be unfair (as could be the case of someone who thinks his pay is more than he deserves). Moreover, an individual can be unsatisfied with his pay but yet claim that it is a fair reward for the work rendered (as could be the case with someone who believes his pay reflects the work done but who nonetheless wishes to do better in terms of income). In short, though expressions of satisfaction indicates whether the individual would like more or less pay, they do not necessarily reveal whether or not the individual believes his pay is justified.

The rest of the paper is structured as follows. Section 2 presents the concept of fairness perception employed and reviews what the literature has to say about the role of fairness considerations in economic outcomes. The hypotheses to be tested are developed in section 3 and the empirical analysis is taken up in section 4. Section 5 concludes.

2.3 Pointers From Economic Theory

2.3.1 Understanding fairness perceptions

According to the theory of fairness postulated by social psychologists, most notably Homans (1961) and Adams (1965), the individual compares his reward-to-investment ratio to that of some relevant other. If the individual perceives his reward-to-investment ratio to be smaller than that of the comparison other, he will feel relatively deprived. If he believes it to be otherwise, he will feel relatively advantaged[7]. Individuals nevertheless, can reduce or eliminate the cognitive dissonance by altering their investments or their perceptions of their investments (for evidence and discussions see Adams and Rosenbaum (1962), Adams (1962), Adams (1965), Andrews (1967), Pritchard *et al* (1972), Austin and Walster (1974)).

However, a longstanding and unresolved issue is that of the identity of the comparison other. In some cases the 'other' can be easily identified as in exchanges involving two actors. Empirical evidence may also help pinpoint the relevant 'other'. For instance, Willman (1982) cites evidence that suggests that manual workers

[7]Adams (1963) states 'if two individuals receive the same pay, but are unequally qualified, then both parties may suffer cognitive dissonance, even the man who is relatively overpaid'. However, how the individual feels about the dissonance is not *per se* germane to the definition of fairness. What matters is simply the presence of (unjustified) inequality.

compare themselves to other manual workers when evaluating the fairness of their pay-effort bargain. On the other hand, Graham and Pettinato (2002) present evidence that imply that individuals compare themselves to others who are in a higher social or income bracket[8]. In other cases, it is quite unclear with whom comparison takes place. For example, in determining the fairness of pay, does the individual compare himself with his peers or those in a different position? Is comparison restricted to those within the firm or does it extend to others working in a different firm, different industry, *et cetera*? Does the worker evaluate the fairness of his pay in light of the profitability of the firm or is it instead a combination of many of these possible 'others'?[9]

Furthermore, where the fairness judgement is by neutral agents as presented in the studies of Kahneman *et al* (1986a, 1986b) and Charness and Levine (forthcoming), in which respondents are asked to evaluate the fairness of a range of policies enforced by firms, it is not apparent that any specific 'other' entity is involved. Yet, individuals do make fairness judgements. The following example from Kahneman *et al* (1986a) may help illustrate this.

[8]This is related to behaviour often classed as 'keeping up with the Joneses'.

[9]See Merton (1967), Parducci (1995), and Ordóñez *et al* (2000) for an in-depth discussion on the nature of comparison groups.

A hardware store has been selling snow shovels for $15. The morning after a large snowstorm, the store raises the price to $20. Please rate this action as:

Completely fair	Acceptable
Unfair	Very unfair

It was found that 82 percent of the respondents rated the actions of the firm as unfair. Nevertheless, it is not obvious whom or what respondents used as the reference other in forming this judgement. It may be supposed that the respondents used a hypothetical comparison other but there is no self-evident reason that necessitates this. From the above example, it is quite plausible that, based on their experience, respondents form some composite reference belief or rule that leads them to conclude that such an unfortunate incident does not justify a hike in price.

From the forgone, it can be argued that an individual's fairness judgement is not likely to be based solely on a direct comparison of reward-to-investment ratios[10]. His innate characteristics and his values and beliefs may, along with this ratio,

[10]With regards to income, the empirical findings of Hampton and Heywood (1993, 1999) and Verhoogen *et al* (2002) demonstrate that individuals' perceptions of fairness are influenced by other factors beside a comparison of reward-to-investment ratios with relevant 'others'

play an important role. Broadly speaking, it is this testable conceptualisation of fairness perceptions that occupies this paper.

2.3.2 The importance of fairness concerns

Probably the most illustrative examples of the role of fairness concerns in individual behaviour are that of ultimatum games. The basic bargaining game involves two players, one of whom is entrusted the task of dividing a good between himself and the other player, say player 2. Player 2 must decide whether to accept the proposed division or to reject it, in which case both players receive nothing. According to standard competitive theory of income maximisation, player 1 will give player 2 the smallest possible division of the good and player 2 will accept since a positive amount is better than none at all. However, many observed outcomes refute this prediction.

Several experiments in Kahneman *et al* (1986b) revealed that in such bargaining games, a large number of individuals are willing to award generous amounts. In the experiments, this behaviour was observed even when there was complete anonymity and no possibility of retaliation. Results showed that the majority of the allocators divided $20 evenly and that receivers rejected positive amounts they perceived to be unfair even though the refusal meant a loss to themselves. Similarly, receivers were prepared to reward fair behaviour, with most willing to give up money to

punish (reward) an unfair (fair) allocator and nearly all preferred to share a sum of money with those who had a reputation of being fair as opposed to being unfair. This inclination of individuals to punish those reputed to be unfair even in cases where they are not themselves victims of the unfair outcome, is supported by results in Thaler (1985) and Kahneman *et al* (1986a). Other experimental evidence show that neither the complexity of the pay off system (see Güth *et al* (1982)) nor an increase in the stakes (see Hoffman *et al* (1996)) eliminates players' desire to offer egalitarian divisions[11].

As one would imagine, it is not only individuals that are guided by fairness considerations. There is also evidence, which suggests that in constructing wage policies, firms take into account employees' concern for fairness (see Blinder and Choi (1990), Campbell and Kamlani (1997) and Fehr *et al* (1998)). For instance, Campbell and Kamlani (1997) found that on average over 69 percent of employers think cutting wages would reduce effort primarily because employees would then perceive their wages as unfair. Interestingly, less than 5 percent thought effort would fall because of a reduction in the cost of shirking.

This seemingly prevalent belief of employers is further supported by the theo-

[11]Such results are used to counter the claims that simple experiments and small amounts such as $20 are inadequate in soliciting typical economic behaviour of individuals.

retical arguments in Akerlof and Yellen (1990) and the empirical evidence in Fehr *et al* (1993), which propose that if workers do not receive what they perceive as a fair wage they will reduce their effort levels, and if they believe they are fairly treated, they will provide effort greater than or equal to the minimum[12]. This implies that fairness considerations can have consequences for the level of productivity in the economy.

This is somewhat echoed by Rotemberg (1996) who claims that changes in individuals' perceptions of the fairness of their wage can be crucial for the distribution of income in a country. This is based on the argument that the equilibrium distribution of income is less unequal when employees believe they are unfairly paid than when they perceive otherwise insofar as they are likely to quit to realise the true value of their productivity elsewhere. In support of this conjecture, he cites evidence that the distribution of income is found to be more equal in countries where people perceive large income inequality to exist.

[12]The experimental studies of Adams and Rosenbaum (1962), Adams (1963), Andrews (1967), Pritchard *et al* (1972), and Austin and Walster (1974), found that given no other means of eliminating cognitive dissonance, when workers perceive their pay to be unfair, whether advantaged or disadvantaged, they respond by changing their effort levels. However, as discussed in Lawler (1968), there is contention over whether those benefiting from unfairness are motivated at all to reduce the cognitive dissonance.

Therefore, based on the surveyed literature, it can be surmised that individuals treat fairness as a normal good for which they are willing to pay a 'price'. They act on fairness considerations and these actions at times diverge from that predicted by the standard model and could have wide-ranging economic consequences. It is then of paramount importance to know what influences fairness perceptions. The following hypotheses are drawn up to help illustrate how fairness-of-pay perceptions are shaped.

2.4 Hypotheses

Several hypotheses about the fairness-of-pay perceptions of workers can be inferred from labour market theories and evidence and a few are put forward to test whether the sign and significance of some of the determinants of fairness perceptions are in line with what these theories and evidence would suggest.

2.4.1 Race and gender discrimination

Pay discrimination, which is characteristically unfair, occurs when two workers with observationally equal productivity-related characteristics are paid differently. It is a well-documented fact that ethnic minorities and women face persistent discrimination in the labour market (see for instance Chiswick (1973), Wright and

Ermisch (1991), and Neumark (1998) *inter alia*)[13]. Their earnings are normally lower than that of their white and male counterparts respectively. For example, using data from the Multi-City Study of Urban Inequality for employers in the USA, Neumark (1998) finds a 10 to 14 percent mean hourly wage differential between men and women and a 19 percent difference between whites and blacks. Between whites and Hispanics, the difference was found to be 4 to 8 percent.

Becker (1971) argues that this discrimination should be unsustainable in the long run. He proposes that if firms discriminate against a particular group of workers, then in a competitive market, non-discriminatory firms will attract all the labour of this unfavoured group. The firms that behave prejudicially would consequently face relatively higher labour costs and in a bid to maximise profits, would be forced to cease discriminatory practices.

Presumably, the realisation of Becker's prediction that discrimination will be eliminated in the long run relies partly on the victims' recognition that they are unfairly treated and their subsequent pursuit to eliminate the unfairness. If individuals do not perceive their situation to be unjust, they will do nothing to alter

[13]Reasons for the persistence of wage differentials between men and women and black and whites have been extensively investigated by Goldberg (1982), Blau and Kahn (1992), Hellerstein *et al* (1997), Neumark (1998), *inter alia*.

what others see as unfair. It is only by recognising and redressing the inequity that more equal pay can be achieved (see Rotemberg (1996))[14]. Moreover, if ethnic minorities and women do not believe their pay to be unfair, welfare and efficiency losses may not be as great as thought.

Given that discrimination against non-whites and women exists in the labour market and supposing that they are aware of this discrimination, they will be more inclined to have a downward bias in the fairness evaluation of their pay. Based on this, the following hypotheses arise:

Hypothesis 1: *Comparing fairness perceptions, female employees will perceive their pay to be less fair than male employees. Moreover, the fairness-of-pay perceptions of non-white female (white female) employees are comparatively lower than that of non-white male (white male) employees.*

Hypothesis 2: *Comparing fairness perceptions, non-white employees will perceive their pay to be more unfair than white employees. Moreover, the fairness-of-pay perceptions of non-white male (non-white female) employees are comparatively lower than that of white male (white female) employees.*

[14]Thus, the persistence of discrimination could be the result of individuals not perceiving their pay as unfair and hence failing to act against it.

2.4.2 Age

There is evidence that older workers face some discrimination in the labour market. However, this is not likely to be related to earnings (Johnson and Neumark (1996)). In fact, older workers appear to be better off where earnings are concerned even taking into account that wage growth is quadratic with age (Lazear (1979)). It is normal for employers to start employees on wages below the value of their marginal product and subsequently increase the wage with tenure as a means of enticing them to remain longer with the firm. Hence, it is usual that younger workers are paid less than their marginal product while older workers receive wages in excess of their marginal product and reservation wage. This is supported by the empirical findings of Hanoch and Honig (1985) and Neumark and Stock (1999). Aware of this, it is probable that relative to older workers, younger workers are more likely to view their pay as unfair.

In addition, according to the arguments of the social psychologists Austin and Walster (1974), age inures individuals to unfairness. They declare that '....we should not be surprised that older people become less aroused and less angry when they encounter inequitable treatment than do younger people who are psychologically unprepared for unjust experiences'. From this, it is further deduced that older ethnic minority workers should have higher fairness-of-pay perceptions than their younger counterparts. Taking the above into consideration leads to:

Hypothesis 3: *Comparing fairness perceptions, younger employees will have a greater tendency than older employees to view themselves as unfairly paid. Moreover, younger employees from ethnic minorities are more likely to perceive their pay as unfair when their perceptions are compared to that of their older counterparts.*

2.4.3 Wage Comparison

Ceteris Paribus, fairness perceptions of pay are more favourable as wage rises but decreases as the comparison wage increases[15]. Thus, the coefficients on the own wage variable and the comparison wage variable should be equal with opposite signs. This leads to:

Hypothesis 4a: *Fairness perceptions are negatively related to the comparison wage.*

Hypothesis 4b: *If relative wage matters for fairness-of-pay perceptions, the coefficients on the wage and comparison wage variables are of equal magnitude but opposite signs.*

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[15]See section 2.

2.5 Empirical Analysis

Many economists are wary of subjective data. To these sceptics, subjective responses are not always representative of actual actions or outcomes. They argue that what an agent thinks does not necessarily translate into reality and what he proposes to do is not what he necessarily does. Undoubtedly, there is merit to this way of thinking[16] but these economists would be hard-pressed to convince other social scientists who draw largely on such data to study human motivation and behaviour, that subjective data are void of information or are not reliable sources for understanding economic and social outcomes.

Given the bias against using subjective data in economics, it is of no surprise that its use in empirical economic analysis is still quite novel. This and the lack in the availability of subjective data sets probably accounts for the relatively few research papers on the economics of individual perceptions. Of those that have looked at issues of fairness perceptions, most have relied on experimental data[17]. It is however important to complement and corroborate the conclusions from experimental data with that from non-experimental data.

[16]The statistical analysis by Bertrand and Mullainathan (2001) seeks to provide concrete reasons why some economists are justified in their mistrust of subjective data.

[17]Experimental data here includes data obtained from responses to hypothetical questions.

Experimental data are normally small-scaled and are often fraught with the problems of effectively simulating a 'real world' environment and capturing or controlling for the many influences on agents' decision-making[18]. Moreover, being able to manipulate the thoughts of individuals to assume the intended role is extremely difficult and success can never be truly ascertained. Non-experimental data on the other hand avoid these problems associated with experimental data and are far more likely to successfully capture the behavioural characteristics of 'real' economic actors. In addition, they contain a wealth of information on various characteristics of the respondents something that does not commonly feature in data from experimental studies[19]. Therefore, non-experimental data are essential and desirable for the study of fairness perceptions.

Notwithstanding, among those studies that have used non-experimental data, the importance of the role of the characteristics of an individual in shaping his fairness perceptions has not been adequately investigated. In conjunction with the

[18]As Manski (2000) notes, interactions observed in artificially constructed environments might, in general, lack credibility.

[19]Nonetheless, experimental data does have advantages over non-experimental data. Most notably, it allows the experimenter to limit the many idiosyncrasies that cannot be easily controlled for in non-experimental data. Notwithstanding, experimental and non-experimental data should generally be regarded as congruent.

studies by Hampton and Heywood (1993, 1999) and Verhoogen *et al* (2002), the analysis presented here addresses this deficiency by looking at the role of the demographic characteristics and a comparison wage in employees' fairness perceptions of pay and establishes how, if at all, these differ from what would ordinarily be expected given established theory and evidence. To this end, use will be made of the British Social Attitudes (BSA) survey data set, which because of the information on individuals' fairness perceptions, is itself, a salient feature of this study.

2.5.1 The Data and Sample

2.5.1.1 *Description*

The BSA Survey is carried out each year and is dedicated to the measure of attitudinal variables. It samples individuals aged 18 and over who reside in the United Kingdom. The survey covers most major topics of modern empirical interest including the economy and labour market participation and a majority of the questions are repeated each year thus, making it possible to pool the data. Unfortunately, given the lack of continuity across years for some of the variables of interest[20], the number of years pooled together is rather small. These are the years 1996 to 2000. Added to this, the survey conducted in 1997 is a scaled-down

[20]The problem is most acute for industry and sector classification.

version as a result of the simultaneously conducted British Election Study and consequently, the number of observations is considerably smaller than that of the other three years. Nonetheless, the pooled sample should provide a reasonable number of observations to carry out a meaningful analysis[21].

Data is used for individuals aged 18 to 65, living in Scotland, England or Wales and who are employees at the time of the interview. In addition, only individuals with valid information are used. The final pooled sample contains 5,486 employees of which 23.44 percent are in 1996, 8.35 percent in 1997, 22.62 percent in 1998, 21.16 percent in 1999, and 24.43 percent in 2000.

The principal advantage of the BSA data set for this investigation is that it contains a specific question that appears to capture fairness perceptions of pay. This sort of question, which addresses a real rather than a hypothetical experience of an employee[22], is not known to be available in any other major data set for the United Kingdom. The survey question reads as follows:

> *How would you describe the wages or salary you are paid for the job you do – on the low side, reasonable, or on the high side? If low: very*

[21] More information about the survey can be found at the UK Data Archive web site.

[22] This is unlike Alves and Rossi (1978) and Shepelak and Alwin (1986) who looked at the fairness perceptions of the income of hypothetical households.

low or a bit low?

Though the question does not explicitly use the term fair(ness), it is taken for granted here that individuals are not likely to regard their wage as both unfair and reasonable or on the low/high side but fair. Hence, the responses are assumed respectively to be identical to very unfairly low, a bit unfairly low, fair, and unfairly high, which are correspondingly equal to less than fair, fair, and more than fair. It is this question that describes the dependent variable, fairness-of-pay perception[23].

[23]According to the Oxford English Reference Dictionary (1996), one of the synonyms for the word 'reasonable' is the word 'fair' and certainly, it is unlikely if not impossible to come up with a convincing example to show that an individual can claim his pay to be unfair but yet reasonable or that it is fair but nevertheless unreasonable. Indeed, there is good reason to believe that individuals interpret such a question in terms of fairness. A search of the Internet for everyday discussions on fair pay reveals that individuals use reasonableness of pay and fairness of pay interchangeably. Three examples, among many, are presented here to illustrate this. 1."It would recognize the millions of Americans – so many of them women – who get up every morning and go to work in our factories, office buildings, and restaurants, and still struggling to raise a family. They deserve a reasonable wage, and we are not going to stop fighting until working Americans get a fair wage, and an increase in the minimum wage." A press release statement by Congresswoman Rosa L. DeLauro (2000). 2. "My experience of last winter was that the staff responded magnificently and they are looking to the system, they are looking to us to acknowledge that by having the right kind of planning and offering them reasonable pay for what we expect. We will not be able to – and I think they appreciate this because they are realistic

Its distribution is as follows:

1.	Very unfairly low	11.41 %
2.	A bit unfairly low	25.48 %
3.	Fair	55.40 %
4.	Unfairly high	7.71 %

In arriving at an answer to the above question, one would expect individuals to compare their pay to that of a relevant comparison other. There are no variables in the BSA data that describe the wage of possible comparison others and hence a measure must be constructed. Indeed, the problem of identifying and quantifying reference group behaviour is a perennial one that retards empirical investigation of

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and they have a public service ethos and I do not think they will expect us to – compete with some crazy private sector offers of £500 to work in a hotel. But they are expecting a fair pay settlement." Statement by Mr Alan Doran in the Select Committee on Science and Technology Minutes of Evidence, United Kingdom Parliament (1999). 3."Workers in the public sector have not seen a fair wage increase for many years now, yet the services we provide are extremely valued by the people in our communities. It's clearly overdue that this is translated into a reasonable wage increase." Cindy Stewart, president of the Health Sciences Association, British Columbia (1998). Thus, it is held here that this question inspires individuals to evaluate whether or not they are correctly remunerated given the perceived value of their investments. As such, responses are assumed to adequately reflect workers' fairness perceptions of their pay.

the social and psychological aspects of economic behaviour and regrettably, theory does not provide any definitive guide to who the comparison other is. Consequently, reference groups are usually arbitrarily chosen. However, it is commonly argued that individuals compare themselves with others who, to varying degrees, possess like characteristics (see for instance, McBride (2001) and Clark (2001)). In line with this, some studies, like that of Clark and Oswald (1996), use the fitted values from a Mincer-type wage equation to proxy the comparison wage[24]. Another approach employed by Clark and Oswald (1996) and McBride (2001), is the calculation and assignment of the average wage by particular characteristics. In the case of Clark and Oswald (1996), each individual is assigned an average wage based on their gender and weekly hours. McBride (2001) assigned each individual an average wage by age. This latter approach is adopted here.

The choice of characteristics on which the comparison wage is calculated is influenced by the evidence in Willman (1982), which suggests that workers compare themselves with those in a similar occupation and by the work of McBride (2001) who finds evidence that individuals compare themselves with others within their age group. It is therefore assumed that workers compare themselves to others with the same occupation and age characteristics and hence, the comparison wage is

[24] Akerlof *et al* (1988) employs the same method to derive an alternative wage measure to study the quit decision of employees.

calculated as the log average hourly wage by occupation and age for each of the years[25]. This creates 175 comparison-wage data points. To increase the precision of the estimates, the comparison wage is constructed using the much larger Labour Force Survey (LFS) data set for the years 1996–2000[26].

Descriptive statistics of all the variables used in the analysis can be found in Table 2.1 and Table 2.2. The demographic composition of the sample is reasonably representative of the population of the United Kingdom. Over 50 percent of the sampled employees are females, only 5 percent are non-whites, and the average age is 39 years.

[25]This is equivalent to a mean regression of log hourly wage on occupation, age and year. Indeed, jobs are normally posted stating occupation and in many cases age requirements. Thus, it is plausible that individuals form comparisons of their pay based on this widely available information.

[26]The years 1996–2000 were used so as to match with the years of the BSA sampled period. Moreover, it is not novel to construct such a measure from a data set separate from the principal one. For different reasons, both the studies by Clark and Oswald (1996) and McBride (2001) construct the comparison wage from data independent from the main data set.

2.5.1.2 *Cross Tabulations - A cursory glance at the data*

Simple cross tabulations indicate that the proportion of employees holding any fairness-of-pay perception is fairly consistent across years especially 1996 to 1998 (Table 2.6). This stability is notable since it exists for different cross-sections of workers which suggests that the sample data is representative of the perceptions of the population and that fairness-of-pay perceptions may be a marked feature in employees' work decisions. Moreover, despite the small number sampled in 1997, the figures show no striking differences in that year. In each of the five years, the median employee perceives his wage to be fair[27] but more than 35 percent believe they are underpaid. Interestingly, and a puzzle for the standard theory, approximately 8 out of 100 employees believe their pay to be more than fair.

Looking across gender and ethnicity, it can be seen from Table 2.7 that female employees have a greater likelihood of perceiving their pay as unfairly low when compared to their male counterparts and as expected, a greater proportion of non-white employees believe that their pay is unfairly low. This, on a first impression, is in accordance with the fact that women and ethnic minorities face discrimination in the labour market but more importantly, their perceptions suggest that they

[27]It is often argued that the perception of the status quo as fair is typically a modal outcome (see Shepelak (1986) and Francioni *et al* (1995)).

may be conscious of the discrimination.

In Table 2.5, it is noted that workers between the ages of 40 and 49 enjoy on average the highest levels of earnings whilst those aged 18 to 29 earn on average the least. However, as is clear from Table 8 it is employees between the ages of 30 and 39 that are the least likely to perceive their wage as unfairly low. Those aged 40 to 49 report feeling more unfairly paid than even those aged 18 to 29. Further, although employees 50 to 59 years of age earn more than 60 to 65 year olds there is no discernable difference between their fairness-of-pay perceptions. Thus, overall, there a is slight suggestion that fairness perceptions of pay decline with age.

The tabulations across age also imply that employees' perceptions are affected by much more than the absolute level of their pay. Indeed, as seen from a comparison between the data presented in Tables 2.3–2.5 and 2.6–2.8, the large differentials that exist in earnings are not replicated in fairness-of-pay perceptions.

Thus far, a preliminary look at the raw data sans controls show that there is some support for hypotheses 1 and 2 but not for hypothesis 3. Both female workers and non-white employees appear to have lower fairness-of-pay perceptions relative to male employees and white employees respectively. However, with age, employees tend to have lower fairness-of-pay perceptions. The next section uses econometric methods to analyse the data more formally.

2.5.2 The Empirical Model and Estimation Strategy

Determinants of fairness-of-pay perceptions are examined in a cross-section fairness regression equation for each randomly sampled employee i at time t. The equation takes the form:

$$F_{it} = \alpha_t + \alpha_1 G_{it} + \alpha_2 R_{it} + \alpha_3 A_{it} + \alpha_4 w_{it} + \alpha_5 \bar{w}_{it} + \alpha_6 \mathbf{Z}_{it} + \epsilon_{it}, \qquad (2.1)$$

where G_{it} represents gender, R_{it} is a race dummy, A_{it} symbolises age, and $\bar{w}_{it}$ is the comparison wage. The vector $\mathbf{Z}_{it}$ contains auxiliary control variables, which include other personal and job characteristics of the employee. These are used mainly as robustness checks on the contribution of the demographic, wage, and comparison wage variables in the determination of fairness perceptions of pay. The error term, ϵ_{it}, is assumed to have a mean of zero and a variance of σ^2.

The discrete ordering of the dependent variable means that it is most appropriate to use an ordered response model[28]. Following what is now a norm in the empirical literature, an ordered probit model (as developed by McKelvey and Zavoina (1975)) is employed to estimate variants of equation (2.1). The probability of a response being in the k^{th} response category of the fairness perception variable (F) is then given by:

[28] A good survey of ordered response models can be found in Amemiya (1981).

$$Pr[F_{it} = k] = \Phi\left[\mu_k - \sum_{i=0}^{k} \beta_i X_{itj}\right] - \Phi\left[\mu_k - \sum_{i=0}^{k-1} \beta_i X_{itj}\right], \qquad (2.2)$$

where the function Φ is the standard normal distribution. The restriction $0 < \mu_1 < \mu_2 < .....\mu_{k-1}$ is imposed to ensure that the probabilities are positive and e_{it} is assumed to be independently identically normally distributed ($i.i.d$) with mean zero and $\sigma^2 = 1$. Higher orders of F represent increasingly favourable fairness-of-pay perceptions from very unfairly underpaid to unfairly overpaid.

Parenthetically, it should be pointed out that what is of interest here is the employee's perception of the relative value of his investments and not whether he is happy or unhappy about any cognitive dissonance[29]. So, whether or not the worker believes an unfairly high pay is bad, is a separate matter from his perception that it is above what he should justifiably receive.

It is also worth noting that the ordered probit procedure does not assume that changes from one fairness perception value to another are equiproportionate. For instance, an improvement in fairness-of-pay perception from very unfairly underpaid to a bit unfairly underpaid is not assumed to be equal to an improvement in fairness-of-pay perception from a bit unfairly underpaid to fairly paid or from

[29]See footnote 5.

fairly paid to unfairly overpaid.

2.5.3 Econometric Issues

2.5.3.1 *Individual heterogeneity and measurement error*

A drawback in using cross-section data is that it is difficult to make concrete statements on causality insofar as it is not possible to control for unobservable individual specific effects. To address the problem posed by individual heterogeneity, estimation of equation (2.1) proceeds in a stepwise fashion. First, a model that includes only the purely exogenous characteristics of the employee is estimated. Other variables of interest are then added in succession to monitor how the preceding estimates change. The more general models are then used for further analysis if variable additions do not significantly alter the results. The robustness of the findings is then checked by the inclusion of a range of auxiliary variables, which helps tackle the problem of possible omitted variable bias, and by additional tests that address other common econometric issues.

A related problem rests on the possibility that the wording of survey items may mean different things to different individuals and responses may also be affected by situational factors such as mood and environment[30]. Consequently, responses

[30]The ordering of the questions, which may influence individuals' interpretation of successive

may be susceptible to (measurement) error. However, it can be argued that within the same country and given the same language, the wording of survey items may not pose a serious problem. Furthermore, in each BSA survey year, recurring questions are worded the same and are repeated in the same order. Nonetheless, some on hand measures are taken here to allow valid inferences to be made. To wit, year dummies are included to capture differences in the survey across years and a random perturbation is introduced in the dependent variable to check the stability of the estimates[31]. In addition, the race dummies works as controls in case ethnic minority groups interpret the questions differently to the wider population.

2.5.3.2 *Self-selection bias*

As is usually the case for many labour market problems, perceptions of pay are recorded only for individuals who are employees. Since individuals choose whether to be employed or not, it is possible that the probability of being an employee is correlated with how the individual would perceive his pay. That is, if an individual's fairness-of-pay perception is likely to be high then the probability of working will be correspondingly high. However, plots of the data indicate that the distri-

questions and hence bias the responses given, may further exacerbate the problem.

[31]This involves introducing random noise, that is, artificially generated measurement errors, in the fairness perception variable and observing whether the estimates remain robust.

bution of characteristics is similar for the sample of employees and non-employees. Moreover, if it is believed that it is individuals who perceive that their pay is likely to be or is unfairly low who would be most prone to choose not to be employees, then based on the standard theory of income maximisation, the high proportion (36.89 percent) of employees stating that their pay is unfairly low should not be noticed. Therefore, as is similarly done in the job satisfaction literature and indeed in many other labour market analyses, it is assumed initially that labour market status is independent of the error term in the fairness equation. Given this, Heckman (1990) demonstrates that legitimate conditional inferences can be made. This assumption is nonetheless tested later as part of the robustness checks.

2.5.3.3 *Earnings*

The data contains information on earnings rather than on wages and hence the analysis uses earnings as an approximation for the wage. Given that wages make up the majority of earnings for most workers, this seems a reasonable way to proceed.

To allow comparability with the comparison wage, the earnings variable must be recorded in a similar form. Since the recorded earnings variable is categorical, it is replaced by the expected values from an hourly earnings interval regression as proposed by Stewart (1983). The earnings model is assumed to have the following latent structure:

$$w_i = \mathbf{X}_i'\beta + u_i \qquad (2.3)$$

i=1,...,N

where w_i is the hourly earnings, which falls into one of K intervals with the k_{th} being given by (I_{k-1}, I_k), which are the lower and upper limits respectively. The vector $\mathbf{X}_i$ is a Jx1 vector of explanatory variables and β_i is a Jx1 vector of unknown parameters. The errors, u_i are assumed to be independently $i.i.d$ with mean zero and variance σ^2. It is further assumed that u_i is independent of $\mathbf{X}_i$. The conditional distribution of w_i is given by

$$w_i|\mathbf{X}_i \sim N(\mathbf{X}_i'\beta, \sigma^2) \qquad (2.4)$$

i=1,...,N

Each employee is assigned a conditional expected earnings level calculated as

$$E(w_i|I_{k-1} < w \leq I_k, \mathbf{X}_i) = \mathbf{X}_i'\beta + u_i + \sigma\left[\frac{g(\mathbf{Z}_{k-1}) - g(\mathbf{Z}_k)}{G(\mathbf{Z}_k) - G(\mathbf{Z}_{k-1})}\right], \qquad (2.5)$$

where g and G represent the density function and cumulative distribution function

of the standard normal respectively and $Z_k = (I_k - \mathbf{X}_i'\beta + u_i)/\sigma$. This method provides consistent estimates unlike the ad hoc practice of taking the midpoint of each interval as a measure[32].

2.5.3.4 *Endogeneity of earnings*

The fairness perception an employee holds regarding his pay is likely to influence the type of job he takes up, his productivity level and consequently his wage. This possible equilibrium relationship between fairness-of-pay perceptions and earnings means that to obtained unbiased estimates, earnings should be instrumented. To this end, the size of the household is used as an instrument on the assumption that it is correlated with earnings, insofar as it is likely to influence whether the worker takes up full-time or part-time employment[33], but unrelated to fairness perceptions of pay. The validity of household size as an instrument for earnings in the fairness-of-pay perception equation is verified using the checks recommended by Bound *et al* (1995) and Staiger and Stock (1997).

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[32]See Stewart (1983) for a discussion and an illustration of the problems associated with such an ad hoc method.

[33]For example, individuals may need to work longer hours to earn enough income to support a larger family.

The partial correlation (R^2) between earnings and household size is 0.001. This degree of correlation is quite low and implies that household size is a weak instrument. Therefore to meet one of the conditions for validity, it must have, as recommended by Staiger and Stock (1997), an F-statistic greater than 10 in the earnings equation. The F-statistic is 16.02, which exceeds the benchmark of 10. This suggests that household size does enter the first stage regression as required (shown in Table A1 of the Appendix). Moreover, the other requirement that household size should not enter the second stage regression is met. The partial correlation (R^2) between fairness-of-pay perceptions and household size is 0.000 and the F-statistic 0.03.

To take into account the fact that the fairness-of-pay perception equations contain the fitted values from supplementary regression, the standard errors are bootstrapped.

2.5.4 Main Results

2.5.4.1 *Gender*

At a glance, the coefficients on the female dummy variable in Table 2.9 suggest that the more similar the environment shared by men and women, the less likely women are to perceive their pay as unfair compared to men. Most notable is

the finding that, while across industries women appear to have lower fairness-of-pay perception, the reverse seems to hold once they are compared to men in like industries. This result implies that women may be concentrated in industries where fairness perceptions are generally low, possibly because these are characteristically low-wage industries. However, within these industries (as shown in column 5), they are on average comparatively more likely to believe that they are fairly paid. The higher concentration of women in low-wage industries may be linked with their need to work part-time possibly because of obligations at home.

The suggested higher fairness-of-pay perception of women is strengthened by the results presented in Table 2.10. With the inclusion of earnings in the equation (columns 1–2), the coefficient on the female dummy variable remains positive and is now statistically significant. This further lends credence to the supposition that the negative sign on the female dummy variable in columns 1–4 of Table 2.9 is driven by the fact that women are mostly employed in low-wage industries where fairness-of-pay perception is correspondingly low. Once these factors are taken into consideration the fairness-of-pay perception attributable to gender becomes more conclusive. This conclusion is unchanged after controlling for the comparison wage.

Further results presented in Table 2.11 show that regardless of their ethnicity, women seemingly have more favourable fairness perceptions of their pay. It is worth

pointing out however that not much emphasis can be placed on the findings for the non-white sample (column 4) as the results are in general poorly determined, potentially due to the rather small sample size. Hence, the results here lead to a rejection of hypothesis 1.

The finding that women are more likely than men to perceive their pay as fair is consistent with the findings of Kuhn (1987) and Barbezat and Hughes (1990). They found that women who face higher levels of conventionally measured pay discrimination are less likely to perceive discrimination. Moreover, it accords with the empirical evidence in the job satisfaction literature, which suggests that women are normally more satisfied than men with the various aspects of their job including pay satisfaction (see for example Hodson (1989) and Clark (1997)). Nonetheless, it is a surprising result that given the well-established labour market fact that women are subjected to pay discrimination, they are still more likely than men to believe that they are fairly rewarded for their labour. Indeed, in contrast to the results here, Hampton and Heywood (1993, 1999) and Verhoogen *et al* (2002) found that female employees are likely to see themselves as being unfairly paid relative to male employees.

2.5.4.2 *Race*

According to the results in Tables 2.9 and 2.10, non-white employees, in comparison to white employees, are more likely to perceive their pay to be unfair. This result is remarkably consistent and highly statistically significant for different specifications of the fairness perception equation[34]. This finding is supported by similar results in Hampton and Heywood (1993, 1999) and Verhoogen *et al* (2002).

Looking at the gender sub-samples in Table 2.11, the relatively lower fairness-of-pay perception of non-white employees is apparent for both men and women though for women, ethnicity appears to matter most[35].

Based on these findings hypothesis 2 cannot be summarily rejected. Thus, it can be concluded that cognisant of discrimination in the market, non-white employees are more likely than whites employees to feel unfairly paid. Interestingly, the findings indicate that even after controlling for earnings, non-white employees still have a greater probability of viewing their pay as unfair. Thus, it can be argued that if non-white employees were to receive wages that are on average greater than

[34]This is so for both those including and those excluding earnings. Although those including earnings are lower in magnitude.

[35]For male employees the coefficient is not statistically significant while for female employees it is.

that of their white counterparts, they would still have a greater tendency to feel underpaid. The air of discrimination that exists in the labour market may serve to bias non-white employees' fairness perceptions of their pay. Thus, policies geared at increasing equality in the labour market should not only concentrate on wages but also on the discriminatory environment that exists.

2.5.4.3 *Age*

A look at Table 2.9 suggests that hypothesis 3 cannot be rejected. As they grow older, employees seem to have increasingly favourable fairness-of-pay perceptions, which based on columns 1 and 2, reaches a peak at age 36, based on columns 3 and 5 a peak at age 34, and according to column 4, a peak at age 35. This is consistent with the positive relationship between fairness perception of pay and age found by Hampton and Heywood (1993, 1999) and Verhoogen *et al* (2002) and is also compatible with the findings by Antecol and Kuhn (2000) that younger women are more likely to report that they face discrimination because of their gender. However, as is evident from Table 2.10 (columns 1 and 2), the initial positive relationship between age and fairness perceptions is accounted for by the fact that older workers earn on average more than younger workers. Moreover, the results are no longer significant. Controlling further for comparison wage (column 3), the influence of age on fairness-of-pay perceptions is now significant at the 10

percent level. Thus, there is a weak indication that, as they get older, individuals do not become inured to unfairness. The results in Table 2.11 tell a similar story. However, it is only for male employees that the result is statistically conclusive[36]. Thus, it would appear that it is only for male employees that hypothesis 3 can be rejected.

2.5.4.4 *Comparison wage*

Contrary to intuition and somewhat a puzzle, the results in Table 2.10 to 2.12 show that the comparison wage has a positive and insignificant impact on individuals' fairness-of-pay perceptions[37]. Admittedly, this result is perhaps an anomaly and it should not be taken to imply that comparison wage is unimportant in the evaluation of how fairly one is paid. It may simply be the case that the average individual's comparison wage is not based on occupation and wage (see Graham and Pettinato (2002)) or possibly that measurement error has served to obscure

[36]One caveat that should be noted for the result pertaining to hypothesis 3 is that it is difficult to separate out the cohort effects.

[37]McBride (2001) also finds that a marginal change in the comparison income based on age will have a positive effect on an individual's well-being. The intuition that may be offered for the positive relationship between fairness-of-pay perceptions and the comparison wage is that upwardly mobile individuals may prefer being surrounded by higher earners as it raises their aspirations.

the results.

2.5.5 Robustness checks

Several checks were done to establish the veracity of the results discussed in the previous section.

First, to ascertain that the results presented in Table 2.9 are not dependent on the order in which the variables are added, the regressions are run several times, each time varying the order in which variables are added. Reassuringly, the results remained essentially the same.

Secondly, a full set of control variables is included in the main fairness-of-pay perception equation (column 3 of Table 2.10) to check the general stability of the findings and to address the problem of omitted variables bias. The results are shown in Table 2.12. The female indicator variable maintains a positive and statistically significant coefficient and that on the non-white dummy variable continues to display a significant negative influence on fairness perceptions of pay. The coefficient on the age variable also remains statistically significant.

The earnings variable has as usual a positive coefficient that is statistically robust and which appears, as would be expected, to have the greatest impact on fairness-of-pay perceptions. The comparison wage is still statistically insignificant

but now exerts a negative influence on fairness perceptions of pay. This seems the intuitively correct sign. However, this result, to some extent, highlights the unreliability of the coefficient on the comparison wage measure[38].

In addition, the marginal effects reported in Table 2.13 seem economically meaningful. Indeed, they indicate that the coefficients for the demographic characteristics of interest are not negligible. According to the estimates, female employees are 9.7 percent less likely to perceive their pay as unfair, 6.9 percent more likely to perceive their pay as fair, and 2.7 percent more likely to regard their pay as being more than fair. Similarly, non-white employees can be expected to be 6.5 percent more likely to believe that they are unfairly paid, 4.9 percent less likely to think that they are fairly paid, and 1.6 percent less likely to believe that they are overcompensated. With regards to age, the estimates suggest that for a one

[38]Using data for the years 1998–2000, an additional regression was performed controlling for the effort and preference for hours of work. This was done to address the possibility that how hard the individual works and his length of exposure to, say an environment in which he experiences relative deprivation, might meaningfully alter the results. For instance, it might be argued that the positive sign on the coefficient for the female indicator variable is probably due to the likelihood that male employees exert greater effort than female employees or to women's lower preference for hours of work, which reduces the experience of an unfavourable environment. The results from the regression yielded nothing qualitatively different to the conclusions already drawn.

year increase in age, employees are 1.6 percent more likely to feel unfairly paid, 1.1 percent less likely to feel fairly paid, and 0.4 percent less likely to feel that they are more than fairly paid.

Thirdly, the possible effects that non-random self-selection into the sample of employees may have on the estimates are investigated. First, the earnings equation is re-estimated using only the non-work related variables in Table 2.13. Next, a probit model for the probability of being employed is estimated and the estimates of the inverse mills ratio, λ, are obtained. This probit equation includes all the variables in the new earnings equation plus housing ownership and year dummy interactions, which serves as instruments. These latter variables are assumed to affect the probability of being employed but are not believed to help determine the earnings. The inverse mills ratio and the predicted earnings are then included in the fairness-of-pay perceptions equation. The results are presented in Table 14.

The inverse mills ratio was found to be statistically significant which indicated that an individual's fairness-of-pay perception probably does affect the probability of being an employee. The negative sign on the coefficient of λ may *prima facie* seem counter-intuitive but it is actually not surprising[39]. A negative coefficient on λ is frequently found in the estimation of wage offer equations (see Wright and

[39] λ also enters the wage equation negatively.

Ermisch (1991) and Dolton and Makepeace (1986)). This arises because of the high correlation that is likely to exist between the observables that raise the reservation wage and those that raise wage offers (see Ermisch and Wright (1994) for a statistical analysis). Individuals that are most productive in jobs will tend to be more productive in non-labour market activities. Thus, since fairness perceptions of pay are tied to wages, the logic follows that as the reservation wage rises, the 'reservation' fairness-of-pay perception rises also and consequently the individual is more likely to be either self-employed or unemployed. What is of paramount importance however is that the directions of the signs on the explanatory variables remain robust: In particular, the sign on the female, race, age, and earnings variables are unchanged. However, only the race variable remains statistically significant. Nonetheless, since this finding suggests that in relation to those who do not work, women who work have lower fairness-of-pay perceptions, the results are likely to be downward biased thus underestimating how much more fairly women regard their pay compared to men.

Next, random disturbances were introduced in the dependent variable to check the sensitivity of the results to the possible existence of measurement error. A set of transition probabilities was defined and a uniform random number was generated. The categories of the dependent variable were then altered based on the values of these probabilities and the random numbers. Several regressions were performed

for varying distributions of the probabilities. The findings for one of these are shown in Table 15 and an insight into the procedure used is shown in Table 16. Once again, the results are encouraging. The main coefficients of interest, with the exception of the age variable in one instance, remain statistically robust and the signs remain unchanged.

Finally, for the specification in 12 the dependent variable is regrouped. This is a simple test of stability, which is different in nature to the other tests. Given the arguably small proportion of observations in category 4 (Unfairly high), it is combined with category 3 (Fair). As shown in Table 17, the sign on the comparison wage is still insignificant but has moved from being negative to being positive while the sign on the rest of the coefficients under examination remain as before and with the exception of the race variable, are statistically significant.

2.6 Conclusion

This paper is the first known systematic study of employees' fairness perceptions of pay for the United Kingdom and for a wide range of occupations. Cross-section data were used to establish what effects the demographic characteristics and the comparison wage of employees have on how fairly they perceive themselves to be remunerated.

The main results suggest that despite facing pay discrimination, compared to male employees, female employees are more likely to believe that they are fairly paid. Given a positive relationship between pay and effort, this implies that for a given wage, female employees would be providing a greater level of effort. This could be judged as unfair. Part of the reason why women have more favourable fairness perceptions of pay may be that they are not aware of the existing pay discrimination or that they may think men posses innate skills deserving of a premium in the labour market. In this case, to tackle this problem, women should be encouraged to align their beliefs with the reality that there is a gender pay gap. This may help them to take the necessary actions that would pressurise employers to move towards pay equality. It can also be argued that female employees may have more favourable fairness-of-pay perceptions than men because they assign a relatively greater value to the other aspects of their job and may be less competitive vis-à-vis pay.

On the other hand, it was found that non-white employees feel that they are unfairly paid. The discriminatory environment that exists against non-white employees may account for the downward bias in their perceptions of pay. In turn, this unfavourable perception of their pay may bear negatively on their effort levels thus leading them to appear less productive than white employees. The result is a somewhat self-fulfilling prophecy. The wrong signal is sent to employers who

over time may become prejudiced against non-white employees. Should non-white employees' confidence be boosted by policies that seek to purge what is broadly called 'institutional racism', their perception of their pay and their effort levels can be improved.

Unfavourable fairness-of-pay perceptions do not wane with age. Instead, employees feel more unfairly paid as they grow older. Financial pressures of career, children in school, and other responsibilities such as aging parents may account for this finding.

Surprisingly, there was no robust evidence of relative income effects. The comparison wage based on occupation and age did not have a significant impact on fairness perceptions of pay and appeared to be positively related to fairness-of-pay perceptions. This anomalous finding may simply be highlighting the need for better data on comparison income measures or a possible econometric specification problem that needs to be resolved in future research.

Considered against the backdrop of evidence that shows a positive relationship between fairness-of-pay perceptions and productivity, the policy implications are important. The results imply that to increase productivity it may be necessary to do more than undertake policies that target wages. In other words, policies that address cultural misgivings and social concerns must be adopted in conjunction

with those that target wages.

Table 2.1: Sample means by fairness perceptions

Variable	*Very unfairly low*	*A bit unfairly low*	*Fair*	*Unfairly high*
Females	0.558	0.527	0.510	0.489
	(0.497)	(0.499)	(0.500)	(0.500)
Non-whites	0.067	0.058	0.052	0.021
	(0.250)	(0.234)	(0.221)	(0.144)
Age (18–64)	39.479	39.667	38.808	37.038
	(11.773)	(11.305)	(10.851)	(10.192)
Children	0.395	0.417	0.406	0.407
	(0.489)	(0.493)	(0.491)	(0.492)
Household Size	2.625	2.603	2.590	2.586
	(1.257)	(1.224)	(1.247)	(1.234)
Housing (1–3)	1.420	1.306	1.258	1.217
	(0.686)	(0.617)	(0.584)	(0.584)
Earnings	1.586	1.780	1.991	2.300
	(0.513)	(0.474)	(0.508)	(0.560)
Comparison Wage	1.928	1.995	2.059	2.141
	(0.317)	(0.344)	(0.348)	(0.367)
Union Member	0.312	0.359	0.356	0.319
	(0.463)	(0.480)	(0.479)	(0.467)
Union Recognition	0.435	0.512	0.526	0.508
	(0.496)	(0.500)	(0.499)	(0.501)
School	0.661	0.731	0.771	0.827
	(0.474)	(0.444)	(0.420)	(0.378)
Post-School	0.629	0.650	0.680	0.723
	(0.483)	(0.477)	(0.466)	(0.448)
Non-Managerial	0.732	0.675	0.605	0.506
	(0.443)	(0.468)	(0.489)	(0.501)
Full-time	0.735	0.785	0.797	0.837
	(0.442)	(0.411)	(0.403)	(0.370)
Tenure (Months)	83.095	93.327	94.657	92.513
	(57.018)	(55.331)	(55.145)	(52.041)

Table 2.1: Sample means by fairness perceptions (continued)

Variable	*Very unfairly low*	*A bit unfairly low*	*Fair*	*Unfairly high*
Firm size (1–5)	2.933	3.105	3.217	3.600
	(1.262)	(1.277)	(1.281)	(1.263)
Relation (1–4)	2.797	2.918	3.133	3.225
	(0.925)	(0.833)	(0.764)	(0.763)
Occupation (1–7)	4.471	4.096	3.769	3.348
	(1.583)	(1.564)	(1.561)	(1.588)
Sector (1–4)	1.685	1.737	1.649	1.428
	(0.989)	(0.996)	(0.971)	(0.854)
Industry (1–15)	8.728	8.459	8.064	7.532
	(3.872)	(3.898)	(3.796)	(3.752)
Number of observations	626	1398	3039	423

Note: 1.Standard errors are in parentheses, 2.The variable 'Relation' describes the nature of the relationship between management and other employees at the workplace. The choices are: 1.Very good, 2.Quite good, 3.Not very good, and 4.Not at all good.

Table 2.2: Sample means by gender and race

Variable	*Male*	*Female*	*Whites*	*Non-whites*	*All*
Fairness-of-pay Perceptions	1.622	1.568	1.602	1.460	1.594
	(0.780)	(0.798)	(0.790)	(0.777)	(0.790)
Females			0.520	0.491	0.518
			(0.500)	(0.500)	(0.500)
Non-whites	0.056	0.050			0.053
	(0.229)	(0.218)			(0.223)
Age (18–64)	38.667	39.246	39.099	36.592	38.967
	(11.150)	(10.943)	(11.112)	(9.494)	(11.046)
Children	0.391	0.423	0.404	0.484	0.408
	(0.488)	(0.494)	(0.491)	(0.501)	(0.491)
Household Size	2.644	2.533	2.581	2.889	2.597
	(1.289)	(1.193)	(1.223)	(1.501)	(1.241)
Housing (1–3)	1.296	1.276	1.276	1.457	1.286
	(0.624)	(0.591)	(0.599)	(0.711)	(0.607)
Earnings	2.038	1.800	1.914	1.930	1.915
	(0.527)	(0.516)	(0.534)	(0.540)	(0.535)
Comparison Wage	2.076	1.995	2.034	2.039	2.034
	(0.358)	(0.332)	(0.347)	(0.344)	(0.347)
Union Member	0.373	0.327	0.348	0.370	0.349
	(0.484)	(0.469)	(0.476)	(0.484)	(0.477)
Union Recognition	0.504	0.517	0.512	0.488	0.510
	(0.500)	(0.500)	(0.500)	(0.501)	(0.500)
School	0.740	0.764	0.749	0.824	0.752
	(0.439)	(0.424)	(0.434)	(0.382)	(0.432)
Post-School	0.690	0.652	0.669	0.689	0.670
	(0.463)	(0.476)	(0.471)	(0.464)	(0.470)
Non-Managerial	0.557	0.698	0.628	0.675	0.630
	(0.497)	(0.459)	(0.483)	(0.475)	(0.483)
Full-time	0.968	0.624	0.787	0.837	0.790
	(0.176)	(0.484)	(0.409)	(0.370)	(0.408)

Table 2.2: Sample means by gender and race (continued)

Variable	*Male*	*Female*	*Whites*	*Non-whites*	*All*
Tenure	104.632	81.865	93.769	76.004	92.833
	(55.677)	(52.590)	(55.269)	(52.757)	(55.278)
Firm size (1–5)	3.319	3.062	3.183	3.239	3.186
	(1.270)	(1.286)	(1.284)	(1.308)	(1.285)
Relation (1–4)	2.967	3.121	3.055	2.895	3.047
	(0.832)	(0.787)	(0.811)	(0.823)	(0.812)
Occupation (1–7)	3.863	3.934	3.901	3.869	3.900
	(1.692)	(1.491)	(1.592)	(1.589)	(1.592)
Sector (1–4)	1.460	1.842	1.655	1.720	1.658
	(0.848)	(1.045)	(0.971)	(1.031)	(0.974)
Industry (1–15)	6.982	9.331	8.179	8.564	8.199
	(3.706)	(3.607)	(3.854)	(3.542)	(3.839)
Number of observations	2643	2843	5197	289	5486

Note: 1.Standard errors are in parentheses, 2.The variable 'Relation' describes the nature of the relationship between management and other employees at the workplace. The choices are: 1.Very good, 2.Quite good, 3.Not very good, and 4.Not at all good.

Table 2.3: Earnings over time

Earnings	1996	1997	1998	1999	2000	All
8000 and less	32.97	31.88	33.68	29.03	24.40	30.11
8001 – 18000	42.77	44.54	39.00	41.69	38.81	40.87
18001 – 29000	18.82	18.56	20.95	20.41	23.43	20.74
29001 and over	5.44	5.02	6.37	8.87	13.36	8.28
All	100.00	100.00	100.00	100.00	100.00	100.00

Note: Columns may not sum due to rounding.

Table 2.4: Earnings by race and gender

Earnings	White			Non-white			All		
	Male	*Female*	*All*	*Male*	*Female*	*All*	*Male*	*Female*	*All*
8000 and less	12.18	46.98	30.27	19.73	35.21	27.34	12.60	46.39	30.11
8001 – 18000	45.59	36.36	40.79	44.90	39.44	42.21	45.55	36.51	40.87
18001 – 29000	28.97	12.88	20.66	25.17	21.13	23.18	28.76	13.30	20.74
29000 and over	13.26	3.78	8.33	10.20	4.23	7.27	13.09	3.80	8.28
All	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00

Note: Columns may not sum due to rounding.

Table 2.5: Earnings by age

Earnings	Age					
	18–29	30–39	40–49	50–59	60–65	All
8000 and less	33.98	26.60	29.09	31.30	39.44	30.11
8001 – 18000	49.76	39.93	34.95	39.37	42.22	40.87
18001 – 29000	13.37	23.68	25.23	20.07	11.67	20.74
29001 and over	2.90	9.78	10.72	9.27	6.67	8.28
All	100.00	100.00	100.00	100.00	100.00	100.00

Note: Columns may not sum due to rounding.

Table 2.6: Fairness-of-pay perceptions over time

Perceptions	1996	1997	1998	1999	2000	All
Very unfairly low	11.98	11.57	11.36	9.82	12.24	11.41
A bit unfairly low	25.58	24.67	24.58	25.32	26.64	25.48
Fair	55.21	56.55	56.33	56.85	53.06	55.40
Unfairly high	7.23	7.21	7.74	8.01	8.06	7.71
All	100.00	100.00	100.00	100.00	100.00	100.00

Note: Columns may not sum due to rounding.

Table 2.7: Fairness-of-pay perceptions by race and gender

Perceptions	**White**			**Non-white**			**All**		
	Male	*Female*	*All*	*Male*	*Female*	*All*	*Male*	*Female*	*All*
Very unfairly low	10.30	12.11	11.24	13.61	15.49	14.53	10.48	12.28	11.41
A bit unfairly low	24.80	25.84	25.34	28.57	28.57	28.03	25.01	25.92	25.48
Fair	56.37	54.61	55.46	55.78	52.82	54.33	56.34	54.52	55.40
Unfairly high	8.53	7.44	7.97	2.04	4.23	3.11	8.17	7.28	7.71
All	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00

Note: Columns may not sum due to rounding.

Table 2.8: Fairness-of-pay perceptions by age

Perceptions	Age					
	18–29	30–39	40–49	50–59	60–65	All
Very unfairly low	12.32	8.92	12.15	13.52	12.78	11.41
A bit unfairly low	24.56	23.97	25.38	29.01	29.44	25.48
Fair	54.19	58.12	55.54	52.13	52.78	55.40
Unfairly high	8.94	8.98	6.93	5.34	5.00	7.71
All	100.00	100.00	100.00	100.00	100.00	100.00

Note: Columns may not sum due to rounding.

Table 2.9: Fairness-of-pay perception for the UK – (Pooled ordered probit regression results – Basic Specification)

Fairness Perception	(1)	(2)	(3)	(4)	(5)
Female	-0.060**	-0.061**	-0.045	-0.027	0.056
	(0.032)	(0.032)	(0.037)	(0.038)	(0.040)
Non-white	-0.250***	-0.291***	-0.278***	-0.276***	-0.264***
	(0.068)	(0.072)	(0.073)	(0.074)	(0.073)
Age	0.036***	0.037***	0.024***	0.026***	0.021***
	(0.010)	(0.010)	(0.011)	(0.011)	(0.011)
Age squared/100	-0.050***	-0.051***	-0.035***	-0.037***	-0.031***
	(0.013)	(0.013)	(0.013)	(0.013)	(0.013)
Year dummies	√	√	√	√	√
Regional dummies		√	√	√	√
Occupational dummies			√	√	√
Sector dummies				√	√
Industry dummies					√
μ_0	0.612***	0.604***	1.141***	1.124***	0.815***
	(0.206)	(0.210)	(0.230)	(0.231)	(0.276)
μ_1	0.874***	0.875***	0.893***	0.893***	0.905***
	(0.023)	(0.023)	(0.023)	(0.023)	(0.023)
μ_2	2.654***	2.657***	2.710*	2.714***	2.751***
	(0.034)	(0.034)	(0.035)	(0.035)	(0.036)
Number of observations	5486	5486	5486	5486	5486
Pseudo R^2	0.004	0.005	0.020	0.021	0.030
Log likelihood	-6119.251	-6114.034	-6024.850	-6018.107	-5958.060

Note: 1.Robust standard errors are in parentheses., 2. *** significant at the 1%, ** significant at the 5%, * significant at the 10%.

Table 2.10: Fairness-of-pay perception for the UK – (Pooled ordered probit regression results – Earnings and comparison wage controls)

Fairness Perception	(1)	(2)	(3)
Female	0.191***	0.257***	0.260***
	(0.03J)	(0.041)	(0.041)
Non-white	-0.212***	-0.211***	-0.213***
	(0.071)	(0.072)	(0.072)
Age	-0.017	-0.018	-0.026*
	(0.012)	(0.012)	(0.016)
Age squared/100	0.011	0.013	0.022
	(0.014)	(0.014)	(0.018)
Gross hourly earnings	0.874***	0.854***	0.854***
	(0.048)	(0.050)	(0.050)
Comparison wage			0.230
			(0.253)
Year dummies	√	√	√
Regional dummies	√	√	√
Occupational dummies	√	√	√
Sector dummies	√	√	√
Industry dummies		√	√
μ_0	0.065	-0.131	10.527
	(0.241)	(0.286)	(0.493)
μ_1	0.953***	0.960***	0.960***
	(0.025)	(0.025)	(0.025)
μ_2	2.900***	2.922***	2.922*
	(0.040)	(0.041)	(0.041)
Number of observations	5486	5486	5486
Pseudo R^2	0.069	0.075	0.075
Log likelihood	-5720.119	-5686.846	-5686.846

Note: 1.Robust standard errors are bootstrapped based on 1000 replications and are presented in parentheses.,

2. *** significant at the 1%, ** significant at the 5%, * significant at the 10%.

Table 2.11: Fairness-of-pay perception for the UK – (Pooled ordered probit regression results – Gender and race subsamples)

Fairness Perception	*Male*	*Female*	*White*	*Non-white*
Female			0.254***	0.427***
			(0.042)	(0.196)
Non-white	-0.148	-0.266**		
	(0.099)	(0.107)		
Age	-0.058***	-0.019	-0.024	0.055
	(0.022)	(0.023)	(0.016)	(0.108)
Age squared/100	0.053**	0.017	0.020	0.044
	(0.026)	(0.026)	(0.018)	(0.128)
Gross hourly earnings	1.082***	0.694***	0.829***	1.570***
	(0.076)	(0.069)	(0.052)	(0.326)
Comparison wage	0.253	0.471	0.150	1.477
	(0.349)	(0.377)	(0.259)	(1.753)
Year dummies	✓	✓	✓	✓
Regional dummies	✓	✓	✓	✓
Occupational dummies	✓	✓	✓	✓
Sector dummies	✓	✓	✓	✓
Industry dummies	✓	✓	✓	✓
μ_0	-0.064	-1.472*	-0.344	-3.359
	(0.653)	(0.856)	(0.500)	(3.624)
μ_1	1.016***	0.932***	0.954***	1.152***
	(0.038)	(0.034)	(0.026)	(0.166)
μ_2	3.095***	2.829***	2.899*	4.004***
	(0.062)	(0.055)	(0.042)	(0.496)
Number of observations	2643	2843	5197	289
Pseudo R^2	0.108	0.059	0.072	0.188
Log likelihood	-2613.369	-3026.104	-5407.678	-252.324

Note: 1.Robust standard errors are bootstrapped based on 1000 replications and are presented in parentheses.,

2. *** significant at the 1%, ** significant at the 5%, * significant at the 10%.

Table 2.12: Fairness-of-pay perception for the UK – (Pooled ordered probit regression results – Full set of controls)

Fairness Perception			
Female	0.259***	Union member	-0.194*
	(0.047)		(0.112)
Non-white	-0.167**	Union recognition	-0.014
	(0.073)		(0.063)
Age	-0.041**	Full-time	-0.114*
	(0.017)		(0.062)
Age Squared/100	0.016	Firm size	0.047***
	(0.023)		(0.017)
Married	0.062	Relation	0.271***
	(0.039)		(0.023)
Children	0.030	Tenure	0.006**
	(0.042)		(0.003)
Gross hourly earnings	0.840***	Tenure squared/100	-0.000
	(0.053)		(0.001)
Comparison wage	-0.140	μ_0	-0.406
	(0.340)		(0.686)
School	-0.018	μ_1	0.984***
	(0.050)		(0.026)
Post-school	0.004	μ_2	2.988***
	(0.059)		(0.042)
Non-managerial	0.090		
	(0.078)		
Number of observations			5486
PseudoR^2			0.091
Log likelihood			-5586.229
Prob> χ^2			0.000

Note: 1.Robust standard errors are bootstrapped based on 1000 replications and are presented in parentheses., 2. *** significant at the 1%, ** significant at the 5%, * significant at the 10%., 3. Year, regional, occupational, sector, and industry dummies are included., 4. Prob> χ^2 (Gross hourly earnings = Comparison wage) = 0.041.

Table 2.13: Fairness-of-pay perception for the UK – (Pooled ordered probit regression results – Marginal effects based on Table 2.12)

Fairness Perception	*Very unfairly low*	*A bit unfairly low*	*Fair*	*Unfairly high*
Female	-0.042***	-0.055***	0.069***	0.027***
	(0.008)	(0.010)	(0.013)	(0.005)
Non-white	0.030**	0.035***	-0.049**	-0.016***
	(0.014)	(0.014)	(0.022)	(0.006)
Age	0.007**	0.009**	-0.011**	-0.004**
	(0.003)	(0.004)	(0.005)	(0.002)

Note: 1.Robust standard errors are in parentheses., 2. *** significant at the 1%, ** significant at the 5%, * significant at the 10%.

Table 2.14: Fairness-of-pay perception for the UK – (Pooled ordered probit regression results – Controlling for sample selection)

Fairness Perception	1		2	
Female	0.056	(0.067)	0.093	(0.140)
Non-white	-0.182	(0.194)	-0.155*	(0.081)
Age	-0.017	(0.022)	-0.044	(0.030)
Age squared/100	0.018	(0.024)	0.051*	(0.029)
Gross hourly earnings	0.333	(0.347)	0.448	(0.619)
Married			0.052	(0.040)
Children			0.044	(0.043)
School			0.029	(0.169)
Post-school			-0.138	(0.090)
λ	-0.446	(0.457)	-0.602***	(0.134)
Regional dummies			✓	
μ_0	1.158	(1.220)	1.578**	(0.681)
μ_1	0.881	(0.884)	0.883***	(0.023)
μ_2	2.673	(2.678)	2.678***	(0.035)
Number of observations		5486		5486
Pseudo R^2		0.010		0.011
Log likelihood		-6085.889		-6076.695

Note: 1.Robust standard errors are bootstrapped based on 1000 replications and are presented in parentheses.,

2. *** significant at the 1%, ** significant at the 5%, * significant at the 10%.

Table 2.15: Fairness-of-pay perception for the UK – (Pooled ordered probit regression results – Checks against measurement error)

Fairness Perception			
Female	0.222***	Union member	-0.023
	(0.045)		(0.059)
Non-white	-0.132*	Union recognition	-0.117
	(0.074)		(0.103)
Age	-0.009**	Full-time	-0.028
	(0.016)		(0.056)
Age Squared/100	-0.011	Firm size	0.020
	(0.021)		(0.017)
Married	0.223	Relation	0.151***
	(0.039)		(0.022)
Children	0.046	Tenure	0.004
	(0.038)		(0.003)
Gross hourly earnings	0.486***	Tenure squared/100	0.000
	(0.044)		(0.001)
Comparison wage	-0.478	μ_0	0.783
	(0.326)		(0.673)
School	0.041	μ_1	1.286***
	(0.045)		(0.027)
Post-school	-0.002	μ_2	2.500***
	(0.056)		(0.034)
Non-managerial	0.082		
	(0.077)		
Number of observations			5486
PseudoR^2			0.034
Log likelihood			-6549.832
Prob> χ^2			0.000

Note: 1.Robust standard errors are bootstrapped based on 1000 replications and are presented in parentheses., 2. *** significant at the 1%, ** significant at the 5%, * significant at the 10%, 3. Year, regional, occupational, sector, and industry dummies are included., 4. Prob> χ^2 (Gross hourly earnings = Comparison wage) = 0.979.

Table 2.16: Procedure used to introduce random disturbances in the dependent variable

Probabilities:

$P_{11} = 0.5$	$P_{12} = 0.4$	$P_{13} = 0.1$	$P_{14} = 0.0$
$P_{21} = 0.1$	$P_{22} = 0.8$	$P_{23} = 0.1$	$P_{24} = 0.0$
$P_{31} = 0.0$	$P_{32} = 0.2$	$P_{33} = 0.7$	$P_{34} = 0.1$
$P_{41} = 0.0$	$P_{42} = 0.1$	$P_{43} = 0.3$	$P_{44} = 0.6$

Reassigning categories using the probabilities and an uniform random number u :

Replace fairness-of-pay perception = 0 if fairness-of-pay perception = 1 and $u \leq 0.1$

Replace fairness-of-pay perception = 1 if fairness-of-pay perception = 0 and $u \geq 0.6$ and $u < 0.9$

Replace fairness-of-pay perception = 1 if fairness-of-pay perception = 2 and $u \leq 0.2$

Replace fairness-of-pay perception = 1 if fairness-of-pay perception = 3 and $u \leq 0.1$

Replace fairness-of-pay perception = 2 if fairness-of-pay perception = 0 and $u > 0.9$

Replace fairness-of-pay perception = 2 if fairness-of-pay perception = 1 and $u > 0.9$

Replace fairness-of-pay perception = 2 if fairness-of-pay perception = 3 and $u > 0.1$ and $u \leq 0.4$

Replace fairness-of-pay perception = 3 if fairness-of-pay perception = 2 and $u > 0.9$

Table 2.17: Fairness-of-pay perception for the UK – (Pooled ordered probit regression results – Dependent variable regrouped)

Fairness Perception			
Female	0.227***	Non-managerial	0.094
	(0.052)		(0.087)
Non-white	-0.119	Union member	-0.209*
	(0.086)		(0.123)
Age	-0.037**	Union recognition	0.003*
	(0.019)		(0.070)
Age Squared/100	0.011	Full-time	-0.100***
	(0.025)		(0.067)
Married	0.058	Firm size	0.033*
	(0.045)		(0.019)
Children	0.021	Relation	0.287***
	(0.046)		(0.025)
Gross hourly earnings	0.824***	Tenure	0.007**
	(0.058)		(0.003)
Comparison wage	0.062	Tenure squared/100	-0.000
	(0.375)		(0.001)
School	-0.016	μ_0	-1.007
	(0.054)		(0.765)
Post-school	0.013	μ_1	0.985***
	(0.064)		(0.026)
Number of observations			5486
PseudoR^2			0.094
Log likelihood			-4435.639
Prob> χ^2			0.000

Note: 1.Robust standard errors are bootstrapped based on 1000 replications and are presented in parentheses., 2. *** significant at the 1%, ** significant at the 5%, * significant at the 10%., 3. Year, regional, occupational, sector, and industry dummies are included.

Bibliography

[1] Adams, J. Stacy (1965), "Inequity in Social Exchange", *Advances in Experimental Social Psychology* in L. Berkowitz (ed), New York: Academic Press.

[2] Adams, J. Stacy (1963), "Toward an Understanding of Inequity", *Journal of Abnormal and Social Psychology*, 67(5):422–436.

[3] Adams, J. Stacy (1963), "Wage Inequities, Productivity and Work Quality", *Industrial Relations*, 3:9–16.

[4] Adams, J. Stacy, and Patricia R. Jacobsen (1964), "Effects of Wage Inequities on Work Quality", *Journal of Abnormal and Social Psychology* , 69(1):19–25.

[5] Adams, J. Stacy, and William B. Rosenbaum (1962), "The Relationship of Worker Productivity to Cognitive Dissonance about Wage Inequities", *Journal of Applied Psychology*, 46(3):161–164.

[6] Akerlof, George A (1982), "Labor Contracts as Partial Gift Exchange", *Quarterly Journal of Economics*, 97(4):543–569.

[7] Akerlof, George A., Andrew K. Rose, and Janet Yellen (1988), "Job Switching and Job Satisfaction in the U.S. Labor Market", *Brookings Papers on Economic Activity*, 2:495–582.

[8] Akerlof, George A., and Janet Yellen (1990), "The Fair Wage-Effort Hypothesis and Unemployment", *The Quarterly Journal of Economics*, CV(2):255–283.

[9] Alves, Wayne M., and Peter H. Rossi (1978), "Who Should Get What? Fairness Judgments of the Distribution of Earnings", *American Journal of Sociology*, 84(3):541–564.

[10] Andrews, I. R (1967), "Wage Inequity and Job Performance", *Journal of Applied Psychology*, 51(1):39–45.

[11] Antecol, Heather and Peter J. Kuhn (2000), "Gender as an Impediment to Labor Market Success: Why Do Young Women Report Greater Harm?", *Journal of Labor Economics*, 18(4):702–728

[12] Austin, William, and Elaine Walster, (1974), "Reactions to Confirmations and disconfirmations of Expectancies of Equity and Inequity", *Journal of Personality and Social Psychology*, 30(2):208–216.

[13] Barbezat, Debra A. and James W. Hughes (1990), "Sex Discrimination in Labor Markets: The Role of Statistical Evidence", *The American Economic Review*, 80(1):277–286

[14] Becker, Gary S (1971), *The Economics of Discrimination*, Chicago and London: The University of Chicago Press.

[15] Bertrand Marianne and Sendhil Mullainathan (2001), "Do People mean What They Say? Implications for Subjective Survey Data", *The American Economic Review Papers and Proceedings*, 91(2):67–72.

[16] Blau, Francine D. and Lawrence M. Kahn (1992), "Race and Gender Pay Differentials", *National Bureau of Economic Research Working Paper Series*, Working Paper No. 4120.

[17] Blinder, Alan S. and Don H. Choi (1990), "A Shred of Evidence on Theories of Wage Stickiness", *Quarterly Journal of Economics*, 105(4):1003–1015.

[18] Bound, John, David A. Jaeger, and Regina M. Baker (1995), "Problems with Instrumental Variables Estimation When the Correlation Between the Instruments and the Endogenous Explanatory Variable is Weak", *Journal of American Statistical Association*, 90(430):443-450.

[19] Bowles, Samuel (1998), "Endogenous Preferences: The cultural Consequences of Markets and other Economic Institutions", *Journal of Economic Literature*, 36:75–111.

[20] Campbell, Carl M. and Kunal S. Kamlani (1997), "The Reasons for Wage Rigidity: Evidence From a Survey of Firms", *The Quarterly Journal of Economics*, 112(3):759–789.

[21] Charness, Gary and David I. Levine, "When are Layoffs acceptable? Evidence from Quasi-Experiments", *Forthcoming.*

[22] Clark, Andrew E. (2001), "Economic Foundations of Subjective Well-Being", Unpublished.

[23] Clark, Andrew E. (1997), "Job satisfaction and gender: Why are women so happy at work?", *Labour Economics*, 4:341–372.

[24] Clark, Andrew E. (2001), "What Really Matters in a Job? Hedonic Measurement Using Quit Data", *Labour Economics*, 8:223–242.

[25] Clark, Andrew E., and Andrew J. Oswald (1996), "Satisfaction and Comparison Income", *Journal of Public Economics*, 61:359–381.

[26] Clark, Kenneth and Martin Sefton (2001), "The Sequential Prisoner's Dilemma: Evidence on Reciprocation", *The Economic Journal*, 111:51-68.

[27] Cook, Karen S (1975), "Expectations, Evaluations and Equity", *American Sociological Review* , 40(3):372–388.

[28] Dawes, Robyn M. and Richard H. Thaler (1988), "Anomalies: Cooperation", *The Journal of Economic Perspectives*, 2(3):187–197.

[29] Dolton, P. J., and G.H. Makepeace (1986), "Sample Selection and Male-Female Earnings Differentials in the Graduate Labor Market", *Oxford Economic Papers*, 38:317–341.

[30] Elster, Jon. (1998), "Emotions and Economic Theory", *Journal of Economic Literature*, 36:47–74.

[31] Ermisch, John F., and Robert E. Wright (1992), "Differential Returns to Human Capital in Full-Time and Part-Time Employment", Issues in Contemporary Economics: Proceedings of the Ninth World Congress of the International Economic Association, Athens Greece in Nancy Folbre, Barbara Bergmann, Bina Agarwal, and Maria Floro ed., 4:195–212, *Women's Work in The World economy*, London: Macmillan in association with the International Economic Association.

[32] Ermisch, John F., and Robert E. Wright (1994), "Interpretation of Negative Sample Selection Effects in Wage Offer Equations", *Applied Economic Letters*, 1:187–189.

[33] Fehr, Ernst, Erich Kirchler, Andreas Weichbold, and Simon Gächter (1998), "When Social Norms Overpower Competition: Gift Exchange in Experimental Labor Markets", *Journal of Labor Economics*, 16(2):324–351.

[34] Fehr, Ernst, Georg Kirchsteiger, and Arno Riedl (1993), "Does Fairness prevent Market Clearing? An Experimental Investigation", *Quarterly Journal of Economics*, 108(2):437-459.

[35] Fehr, Ernst, Simon Gächter, and Georg Kirchsteiger (1997), "Reciprocity as a Contract Enforcement Device: Experimental Evidence", *Econometrica*, 65(4):833–860.

[36] Fehr, Ernst and Klaus Schmidt (1999), "A Theory of Fairness, Competition and Cooperation", *Quarterly Journal of Economics*, 114:817–868.

[37] Fehr, Ernst and Simon Gächter (2000), "Fairness and Retaliation: The Economics of Reciprocity", *Journal of Economic Perspective*, 14(3):159–181.

[38] Franciosi, Robert, Praveen Kujal, Roland Michelitsch, and Vernon Smith and Gang Deng (1995), "Fairness: Effect on Temporary and Equilibrium Prices in Posted-Offer Markets", *The Economic Journal*, 105(431):938-950.

[39] Goldberg, Matthew S. (1982), "Discrimination, Nepotism, and Long-Run Wage Differentials", *Quarterly Journal of Economics*, 97(2):307–319.

[40] Graham, Carol, and Stephano Pettinato (2002), *Happiness and Hardship: Opportunity and Insecurity in New Market Economies*, The Brookings Institution, Virginia: R.R. Donnelley and Sons.

[41] Güth, Werner, Rolf Schmittberger, and Bernd Schwarze (1982), "An Experimental Analysis of Ultimatum Bargaining", *Journal of Economic Behavior and Organization*, 3:367–388.

[42] Hampton, Mary B. and John S. Heywood (1999), "The Determinants of Perceived Underpayment: The Role of Racial Comparisons", *Review of Social Economy*, 57(2):141–153.

[43] Hampton, Mary B. and John S. Heywood (1993), "Do Workers Actually Perceive Gender Wage Discrimination?", *Industrial and Labor Relations Review*, 47(1):36–49.

[44] Heckman, James (1979), "Sample Selection Bias as a Specification Error", *Econometrica*, 47(1):153–162.

[45] Heckman, James (1990), "Selection Bias and Self Selection", *The New Palgrave: Econometrics* in Eatwell, J.M.M and P.N ed.,Washington: Brookings Institute.

[46] Heckman, James (1990), "Varieties of Selection Bias", *The American Economic Review: Papers and Proceedings of the Hundred and Second Annual Meeting of the American Economic Association*, 80(2):313–318.

[47] Hellerstein, Judith K., David Neumark, and Kenneth R. Troske (1997), "Market Forces and Sex Discrimination", *National Bureau of Economic Research Working Paper Series*, Working Paper 6321:1–36.

[48] Hodson, Randy (1989), "Gender Differences in Job Satisfaction", *The Sociological Quarterly*, 30(3):385–99.

[49] Hoffman, Elizabeth, Kevin A. McCabe, and Vernon L. Smith (1996), "On Expectations and the Monetary Stakes in Ultimatum Games", *International Journal of Game Theory*, 25:289–301.

[50] Hoffman, Elizabeth, Kevin A. McCabe, and Vernon L. Smith (1996), "Social Distance and Other-Regarding Behavior in Dictator Games", *The American Economic Review*, 86(3):653–660.

[51] Hoffman, Elizabeth and Matthew L. Spitzer (1985), "Entitlements, Rights, and Fairness: An Experimental Examination of Subjects' Concepts of Distributive Justice", *Journal of Legal Studies*, 14:259–297.

[52] Homans, G. C. (1961), *Social Behavior: Its Elementary Forms*, Robert K. Merton ed. New York, Burlingame: Harcourt, Brace and World, Inc.

[53] Isaac, R. Mark, Kenneth F. McCue, and Charles R. Plott (1985), "Public Goods Provision in an Experimental Environment", *Journal of Public Economics*, 26:51–74.

[54] Johnson, Richard W. and David Neumark (1996), "Age Discrimination, Job Separations, and Employment Status of Older Workers: Evidence from Self-Reports", *National Bureau of Economic Research Working Paper Series*, Working Paper 5619.

[55] Kahneman, Daniel, Jack L. Knetsch, and Richard H. Thaler (1986b), "Fairness and the Assumptions of Economics", *Journal of Business*, 59(4):S285–S300.

[56] Kahneman, Daniel, Jack L. Knetsch, and Richard H. Thaler (1986a), "Fairness as a Constraint on Profit Seeking: Entitlements in the Market", *The American Economic Review*, 76(4):728–741.

[57] Kuhn, Peter J.(1990), "Sex Discrimination in Labor Markets: The Role of Statistical Evidence: Reply", *The American Economic Review*, 80(1):290–297

[58] Kuhn, Peter J.(1987), "Sex Discrimination in Labor Markets: The Role of Statistical Evidence", *The American Economic Review*, 77(4):567–583.

[59] Lazear, Edward P (1989), "Pay Equality and Industrial Politics", *The Journal of Political Economy*, 97(3):561–580.

[60] LeDoux, Joseph (1998), *The Emotional Brain - The Mysterious Underpinnings of Emotional Life*, London, England: Phoenix.

[61] Levine, David I. (1993), "Fairness, Markets, and Ability to Pay: Evidence From Compensation Executives", *The American Economic Review*, 83(5):1241–1259.

[62] Manski, Charles F. (2000), "Economic Analysis of Social Interactions", *Journal of Economic Perspectives*, 14(3):115-136.

[63] Manski, Charles F. (1993), "Identification of Endogenous Social Effects: The Reflection Problem", *Review of Economic Studies* 60:531–542.

[64] McBride, Michael (2001), "Relative-Income Effects on Subjective Well-being in the Cross Section", *Journal of Economic Behavior and Organization*, 45:251–278.

[65] McKelvey, Richard D., and William Zavoina (1975), *A Statistical Model for the Analysis of Ordinal Level Dependent Variables*, 4:103–120.

[66] Neumark, David (1998), "Labor Market Information and Wage Differentials by Race and Sex", *National Bureau of Economic Research Working Paper Series*, Working Paper 6573.

[67] Ordóñez, Lisa D., Terry Connolly, and Richard Coughlan (2000), "Multiple Reference Points in Satisfaction and Fairness Assessment", *Journal of Behavioral Decision Making*, 13(3):329-344.

[68] Parducci, Alan (1995), *Happiness, Pleasure, and Judgment: The Contextual Theory and Its Applications*, Mahwah, New Jersey: Lawrence Erlbaum Associates, Inc.

[69] Pritchard, Robert D., Marvin D. Dunnette, and Dale O. Jorgenson (1972), "Effects of Perceptions of Equity and Inequity on Worker Performance and Satisfaction", *Journal of Applied Psychology* Monograph 56(1):75–94.

[70] Rabin, Matthew (1997), "Bargaining Structure, Fairness, and Efficiency", Unpublished.

[71] Rabin, Matthew (1993), "Incorporating Fairness into Game Theory and Economics", *The American Economic Review*, 83(5):1281–1302.

[72] Rabin, Matthew (1998), "Psychology and Economics", *Journal of Economic Literature*, 36:11–46.

[73] Rotemberg, Julio J. (1996), "Perceptions of Equity and the Distribution of Income", *National Bureau of Economic Research Working Paper Series*, Working Paper 5624.

[74] Roth, Alvin E., Vesna Prasnikar, Masahiro Okuno-Fujiwara, and Shmuel Zamir (1991), "Bargaining and Market Behavior in Jerusalem, Ljubljana, Pittsburgh, and Tokyo: An Experimental Study", *The American Economic Review*, 81(5):1068–1095.

[75] Shepelak, Norma J. and Duane F. Alwin,(1986), "Beliefs about Inequality and Perceptions of Distributive Justice", *American Sociological Review*, 51(1):30–46.

[76] Stewart, Mark B. (1983), "On Least Squares Estimation When The Dependent Variable is Grouped", *The Review of Economic Studies*, 50(4):737–753.

[77] Thaler, Richard H. (1988), "Anomalies: The Ultimatum Game", *The Journal of Economic Perspectives*, 2(4):195–206.

[78] Thaler, Richard H. (1985), "Mental Accounting and Consumer Choice", *Marketing Science*, 4(3):199–214.

[79] Verhoogen, Eric, Stephen V. Burks, and Jeffrey P. Carpenter (2002), "Fairness and Freight-Handlers: A Test of Fair-Wage Theory in a Trucking Firm", *Center for Labor Economics, University of California Berkeley, Working Paper Series*, Working Paper No.56.

[80] Willman, Paul (1982), *Fairness, Collective Bargaining, and Incomes Policy*, Oxford: Clarendon Press.

[81] Wright, Robert E., and John F. Ermisch (1991), "Gender Discrimination in the British Labour Market: A Reassessment", *The Economic Journal*, 101(406):508–522.

2.7 Appendix 2A

Table 2.A1: Wage equation for UK employees – First stage (interval) regression results

Fairness Perception			
Female	-0.207***	Post-school	0.130***
	(0.019)		(0.022)
Non-white	-0.061***	Non-managerial	0.032
	(0.032)		(0.030)
Age	0.040***	Union member	-0.031
	(0.007)		(0.045)
Age Squared/100	-0.055***	Union recognition	-0.016
	(0.009)		(0.024)
Married	0.026*	Full-time	-0.077***
	(0.015)		(0.025)
Children	0.037*	Firm size	0.042***
	(0.021)		(0.007)
Household size	-0.035***	Relation	0.030***
	(0.009)		(0.009)
Comparison wage	-0.078	Tenure	0.002**
	(0.131)		(0.001)
School	0.125***	Tenure squared/100	0.000***
	(0.020)		(0.000)
Number of observations			5486
Log likelihood			-12562.901
Prob> χ^2			0.000

Note: 1.Robust standard errors are bootstrapped based on 1000 replications and are presented in parentheses., 2. *** significant at the 1%, ** significant at the 5%, * significant at the 10%., 3. Year, regional, occupational, sector, and industry dummies are included.

Chapter 3

Does the Fairness of the Distribution of Wealth Affect Individual Labour Supply?

3.1 Abstract

Expanding on the theory put forward by Akerlof (1980) on the role of social custom in economic behaviour, this paper develops a simple theoretical model that explains how an individual's labour supply decision may be affected by the fairness of the wealth distribution. The accompanying empirical analysis supports the theoretical conclusion that individual labour supply and the fairness of the wealth distribution may be positively related. Specifically, using panel data, the within-group estimates reveal that for the average male employee, labour supply tends to fall as fairness perceptions of the wealth distribution becomes more unfavourable. Where productivity is concerned, this study may help understand the differences between egalitarian and less egalitarian societies.

Key words: Social norms; Labour supply; Fairness; Wealth distribution

JEL Classification: C23; C25; D11; D12; D31; D63; J22

3.2 Introduction

Wealth inequality and its effects are a matter of huge concern for the global body politic. In fact, it has remained a preoccupation of both economists and politicians. Notwithstanding, wealth inequality has continued to increase within countries (see Korzeniewicz and Moran (1997), Föster and Pearson (2002) and Milanovic (2002) *inter alia*) and between countries (see Goodman (2001) and Sala-i-Martin (2002) *inter alia*). In response, many individuals engage in protests[1]. Some of these protests are vocal and often take the form of visible demonstrations. Others are less visible as in the case of individuals engaging in non-paid voluntary activities aimed at helping the disadvantaged or refusing to support governments or companies thought to be purveyors of inequality.

The prevalence of voluntary activities in the UK is revealed from surveys commissioned by the Institute for Volunteering Research (IVR) in 1991 and 1997[2]. It was found that in both years, approximately 50 percent of the UK adult population engaged in formally organised voluntary activities (which is defined as work

[1]Some might argue that an unequal wealth distribution has been the catalyst for much of the recent conflict within and across nations and the ensuing protests.

[2]The first survey was carried out in 1981. The reports are available via the web site at www.ivr.org.uk.

arranged through an organisation) whilst well over 70 percent was involved in informal voluntary activities (that is, work done on an individual basis). What is more substantive and salient is the finding that the number of hours that the existing volunteers spent per week on voluntary work increased by 50 percent – up from an average of 2.70 hours in 1991 to 4.05 hours in 1997[3]. Much of this increase was due to a growth in activities aimed at helping the disadvantaged.

The increase in the number of hours spent on voluntary work coincides with an increase in wealth inequality in the UK. From 1991 to 1997, the percentage of wealth owned by the top 10 percent of the wealthiest individuals, increased from 47 percent to 54 percent[4]. Evidence from the IVR surveys suggest that these two may indeed be correlated. It was discovered that a large proportion of individuals who undertake voluntary work do so for purely altruistic reasons and many believe that there would be no need for volunteers if the government met all its obligations such as, one would imagine, achieving a more equitable wealth distribution.

Individuals' volition to take action that are clearly costly to them (for exam-

[3]The total number of hours volunteered increased from 62 million in 1991 to 88 million in 1997.

[4]Data are obtained from the Office of National Statistics, which are available at http://www.statistics.gov.uk.

ple, lost labour income or more broadly lost consumption) can be rationalised by the existence of social norms. Social norms are a pervasive part of economic life and thus, can exercise decisive influence over individuals' decision process. Their violation by self or by others may lead to a loss of "psychic income" and the underprovision of a public good.

The survival of norms depends on the willingness of individuals to act in ways that enforces and preserves them. Ergo, it can be argued, if there is a general concern for fairness and the norm of fairness is violated, as in the case of an unfair wealth distribution, individuals will seek to reduce the consequent loss of psychic income and maintain this public good by devoting time and effort towards activities aimed at restoring a fair state. In this way, wealth inequality may be negatively correlated with the time dedicated to labour market work. At this juncture, it is interesting to note that it is employed individuals who are most likely to do voluntary work[5].

However, it is not possible to rule out *a priori* a positive relationship between wealth inequality and hours of work. For instance, it is possible that greater inequality in society may serve to undermine or erode social norms and encourage

[5]This is based on the findings of the 1991 and 1997 surveys on voluntary work commissioned by the Institute for Volunteering Research.

more individualistic and competitive behaviour. As a result individuals would be motivated to work harder[6].

Yet, though there exists broad awareness of the impact of wealth inequality at the macro level, particularly in the case of productivity[7], little is known of its influence on the micro level choices of individuals, which one might expect to lie behind the macro outcomes. Certainly, it does not appear that there are any studies which have sought to discover whether individual labour supply responds in a meaningful way to changes in the equality or fairness of the wealth distribution. On the other hand, whilst there are microeconomic analyses of the impact of fairness violations by one agent on the effort choice of the individual who is directly affected (see Adams and Rosenbaum (1962) and Fehr *et al* (1993) *inter alia*), the importance of individuals concern for distributional fairness, that is whether they are directly affected by unfairness or not, is often overlooked.

This paper thus seeks to investigate whether an unfair wealth distribution has a deleterious impact on labour supply. It finds that, for male individuals, labour

[6]That is, individuals might seek to keep up with the Joneses and ahead of the Smiths by working harder in order to increase income.

[7]See for example the influential works of Galor and Zeira (1993) and Persson and Tabellini (1994) *inter alia*.

supply decisions are not based solely on pecuniary concerns. Indeed, concern for a fair wealth distribution matters.

The rest of the paper is organised as follows. In Section 2 a brief overview of the related literature is provided. Section 3 develops a simple theoretical model to explain how an unfair wealth distribution may impact on the labour supply decision of the individual. The theoretical predictions of the model then form the basis of the empirical analysis which is presented in Section 4. Section 5 concludes.

3.3 A brief overview of related studies

The labour supply of individuals represents perhaps the most productive resource of an economy. Hence, understanding what determines individual labour supply is of paramount importance and indeed much effort has been dedicated to the study of the determinants of labour supply. A systematic analysis of some of the major studies can be found in Ashenfelter and Layard (1986). Nonetheless, there remains a paucity of studies that explore the importance of factors that reflect individuals' values and opinions.

As with other aspects of life, an individual's labour market behaviour is shaped in part by social norms. For instance, in some societies male members are expected to be in full-time employment and to be the main bread winners whereas the same

level of attachment to the labour market is not expected from female members. Instead, women are expected to devote more time to the care of the home and community. Therefore, social norms that prescribe the societal roles of men and women may influence the amount of time the individual commits to labour market work (see for example Stutzer and Lalive (2001), Feldman(2002), and Cornwell *et al* (2000)) and even how much effort he expends (see Levine (1992)). Whilst these studies provide implicit reasons why social norms may affect labour market behaviour they do not provide a formal framework within which the effect of social norms on marginal choices might be established.

The theoretical model of Akerlof (1980) offers a more formal conceptualisation of this implicit proposition that social norms affect marginal choices. Extending the standard utility function, Akerlof (1980) demonstrates how social customs may enter non-additively in the utility function and in so doing affect labour market behaviour. His approach rests on the premise that when there is a common willingness to punish those who deviate from accepted behaviour, the desire to pursue pecuniary gains is tempered by the costs of deviation. Building further on this idea while narrowing the focus, de Neubourg and Vendrik (1994) illustrate how some social norms can influence the labour supply decision of the individual and how these norms may account for the differences between male and female labour supply behaviour. However, these studies only concentrate on what may be de-

scribed as local violations of norms in that they restrict consideration to how an individual's behaviour is affected if he violates a social norm. Neither study has explicitly considered how an individual's economic behaviour is influenced by the violation of social norms at the global level. Likewise, it appears that most studies focusing on specific norms prefer to concentrate on local violations, be it by the individual in concern or by some other agent.

A particular norm, which has attracted considerable attention of late, is the norm of fairness. Where work is concerned, fairness considerations appear to play a role in effort choice determination. This is persuasively corroborated by theoretical arguments such as that of Akerlof (1982) and Akerlof and Yellen (1990) and supported by experimental evidence both in the social psychology and economics literature. Studies such as those by Adams and Rosenbaum (1962), Andrews (1967), and Fehr *et al* (1993) *inter alia* conclude that effort is positively related to the (perceived) fairness of the pay received. They typically found that fairness concerns affect individuals' effective labour supply. Specifically, it was found that when individuals are treated unfairly with regard to pay, they respond by reducing their effort level and when they believe they are generously remunerated, they appear to increase their effort levels above the minimum required. In other words, individuals appear to abide by the ethos 'a fair day's work for a fair day's pay'.

Of course, it is not only the fear of retribution for violating the norm of fairness

nor when unfairness is directed towards them that individuals care about fairness. Individuals have a preference for fairness which is seen, for example, through their wish to support redistributive measures (see Carlsson *et al* (2001), Fong (2001) and Corneo and Grüner (2002) *inter alia*)[8] and their desire to punish those who are reputed to behave unfairly regardless of the object of the unfairness (see for example, Thaler (1985) and Kahneman *et al* (1986a, 1986b)). Indeed, when the norm of fairness is violated, individuals suffer a loss of psychic income. That is, unfairness is a bad that leads to 'cognitive dissonance'. This means that preference for fairness would be in conflict with the experience of unfairness. Moreover, individuals feel displeasure because of associated emotions such as guilt, pity and anger. As a result, they may take remedial action, which includes changing their beliefs to achieve consonance, in an attempt to reduce this loss. Coupled with the proposition that social norms affect marginal choices, this implies that concerns for distributional fairness can instruct much of the individual's decision-making not least his labour supply choice.

On the whole, it can be said that, through theoretical arguments and experimental evidence, the literature has succeeded in showing that economic behaviour

[8]This is lucidly conveyed by the statement "people might not support the redistributive program which maximizes their private benefit, but the one which conforms with their vision of what constitutes a good policy for society as a whole" (Corneo and Grüner (2002)).

may be informed by social norms and, of importance here, that an individual's effective labour supply may respond to unfairness particularly when the individual is directly affected by the unfair outcome. Hitherto however, it does not appear that there are any studies that endeavour to discover whether and how global concerns for fairness might affect microeconomic choices. This present study addresses this gap in the literature by providing an analysis of the possible effects that concerns for distributional fairness may have on labour market behaviour. It also complements existing experimental studies by providing a non-experimental analysis of the role of fairness perceptions in shaping individual labour supply behaviour.

3.4 How might the fairness of the wealth distribution affect labour supply?

3.4.1 A basic framework

The canonical model of labour supply often presented in textbooks postulates that an individual's labour supply decision rests upon the maximisation of the following utility function:

$$U(X, L) \tag{3.1}$$

subject to:

$$PX \leq Y = Y_n + wH \quad \text{(income budget constraint)} \tag{3.2}$$

$$T = H + L \quad \text{(time budget constraint)} \tag{3.3}$$

where T is the total time available, H is the number of hours out of T spent working and L is the total time out of T spent on leisure, which is taken here to represent time spent engaged in activities other than labour market activities. Total disposable income, Y, consists of non-labour income, Y_n, and labour income, wH, with w being the hourly wage rate. All the goods and services consumed by the individual is represented by X and P is the price of this composite commodity.

The role of non-pecuniary preferences, such as fairness considerations, in shaping individual's labour supply choice is largely ignored in this model. Instead emphasis is essentially placed on pecuniary preferences. This is however, an inadequate representation of the reality. As is now widely accepted by economists, non-pecuniary concerns can and do have decisive bearing on microeconomic outcomes[9]. Of particular relevance here is the model of de Neubourg and Vendrik

[9]Elster (1998) contains a survey of studies that consider the impact of non-pecuniary concerns

(1994). Following the model of Akerlof (1980), they argue that social norms enter non-additively in the utility function and can therefore shape labour market behaviour.

Maintaining the assumption that social norms affect marginal choices, the canonical model is reformulated in this study to explicitly take into account the norm of fairness a propos the wealth distribution. For the sake of simplicity, it is assumed that the societal norm of fairness is both well-established and accepted by all, though agents care to different extents about the fairness of the wealth distribution. Hence, individuals are believed to be both altruistic in that they care that others are treated fairly, feeling discomfort when they are not and self-centred, that is to say they care that they as individuals are treated fairly, feeling resentful when they are not (for reasoning, see Adams (1965), Kahneman *et al* (1986b), and Fehr and Schmidt (1999) *inter alia*). Stated differently, individuals can be said to be inequality averse (Carlsson *et al* (2003)). This implies that any activity geared towards reducing unfairness will be utility increasing and more so the higher the existing level of unfairness[10]. The intuition for this rests on the law of diminishing marginal returns – the marginal benefit of extra fairness-increasing work to a

on economic behaviour.

[10]It seems reasonable to suggest that when things in society are unfair, there is a heightened sense that fairness-increasing activities are important.

fair society is less than the marginal benefit of extra fairness-increasing work to a society with a lower level of fairness. For that reason, it is assumed here that individuals devote time to fairness-increasing activities, which is more rewarding the higher the level of unfairness[11].

So then, the individual chooses his optimal labour supply by maximising the utility function:

$$U = U(X, \hat{L}, V, F; \theta) \tag{3.4}$$

The function U is assumed to be concave and strictly increasing in X and $\hat{L}$. As before, X represents a composite good, which includes 'consumption' such as charitable donations. The amount of time the individual devotes to fairness-increasing activities, such as helping in the vocational training of individuals in need and fundraising to help supplement the incomes of the poor, is given by V and the leisure time enjoyed by the individual is denoted by $\hat{L}$. In this case, $\hat{L}$ is the time spent on activities other than labour market and fairness-increasing activities[12]. In

[11]This can also be rationalised in terms of a demand framework. The greater the demand for fairness, the higher is the 'shadow price' or value of fairness-increasing activities.

[12]This is similar to the assumption in the allocation of time model by Becker (1965), later formalised by Gronau (1977), that individuals maximise utility by dividing their time optimally

line with Romer (1984), the assumption is made that the norm of fairness can be violated to various degrees ranging from an wholly unequal distribution of wealth to a completely fair distribution of wealth. This is captured by the parameter $F \in [0,1]$ with increasing values of F symbolising an increasingly fair distribution. The extent to which the individual cares about fairness is represented by θ[13]. The canonical model obtains when $\theta = 0$, in which case utility is independent of the wealth distribution.

Using the quadratic form of de Neubourg and Vendrik (1994), the individual's direct utility function can be written as:

$$\underset{\{V,H\}}{Max}\ U = \alpha + \beta X - \frac{1}{2}\varphi X^2 + \gamma \hat{L} - \frac{1}{2}\kappa \hat{L}^2 - \delta\theta c(Y, 1-F) + \xi\theta(1-F)V, \quad (3.5)$$

subject to:

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between leisure, labour market work, and home production.

[13]Whilst an individual's preferred way of solving the problem of unfairness might depend on income (for instance, his preference for redistribution), his feelings *per se* towards unfairness should not. There is no *a priori* reason to suppose that as an individual gets wealthier he becomes inured to unfairness, caring less and less about the well being of others.

$$X \leq Y = Y_n + wH \quad \text{(income budget constraint)} \tag{3.6}$$

$$T = H + \hat{L} + V \quad \text{(time budget constraint)} \tag{3.7}$$

where P is normalised to 1 for simplicity and θ has some unknown distribution among individuals[14]. The second to last term, $\delta\theta c(Y, 1-F)$, describes the utility loss when wealth is unfairly distributed[15]. The cost of unfairness, c, embodies the cognitive dissonance and the social problems, such as crime, that arise because of the unfair wealth distribution. This cost is magnified by the level of unfairness on the account that cognitive dissonance is felt more keenly and social problems are more prevalent, the greater the level of unfairness (see Kelly 2000 for empirical evidence). On the other hand, the cost of unfairness is moderated as income rises insofar as the individual is able to reduce cognitive dissonance by making charitable donations or living in neighbourhoods where reminders of inequality are fewer. The individual can also limit exposure to social problems by purchasing insurance for instance, or by investing in a safer neighbourhood. Therefore, $\frac{\partial c}{\partial Y} < 0$ and $\frac{\partial c}{\partial F} < 0$.

[14]Note that the parameters $\alpha, \beta, \varphi, \gamma, \kappa, \delta$, and ξ represent positive constants.

[15]This is in like spirit to a similar term in the model of Akerlof (1980) and de Neubourg and Vendrik (1994). In these models, the cost is a result of the *individual* disobeying a norm he believes in.

The final term represents the gain in utility from addressing unfairness, which is greater the higher the level of unfairness[16].

Substituting the constraints of equation (3.6) and (3.7) into the objective function, the interior solution for the optimal time spent on labour market work, (H^*), satisfies the following expression:

$$\frac{\partial U}{\partial H} = \beta w - \varphi(Y_n + wH)w - \gamma + \kappa(T - H - V) + \delta\theta c_1(Y_n + wH, 1 - F)w = 0 \quad (3.8)$$

Therefore:

$$H^* = \frac{(\beta - \varphi Y_n + \delta\theta c_1(.))w - \gamma + \kappa(T - V)}{\varphi w^2 + \kappa}, \quad (3.9)$$

where $c_1(.) = c_1(Y_n + wH, 1 - F)$.

Similarly, the interior solution for the optimal time spent on fairness-increasing activities, (V^*), is given by:

[16]It is these last two terms, the time constraint of equation (3.6) in which V is added, and the fact that the violation of the norm is taken to be exogeneous that fundamentally distinguishes this model from that of Akerlof (1980) and de Neubourg and Vendrik (1994) and makes it novel.

$$\frac{\partial U}{\partial V} = -\gamma + \kappa[T - H - V] + \xi\theta(1 - F) = 0 \tag{3.10}$$

This leads to:

$$V^* = \frac{-\gamma + \kappa(T - H) + \xi\theta(1 - F)}{\kappa} \tag{3.11}$$

Solving equations (3.9) and (3.11) simultaneously yields[17]:

$$H^* = \frac{(\beta - \varphi Y_n + \delta\theta c_1(.))w - \xi\theta(1 - F)}{\varphi w^2} \tag{3.12}$$

and

$$V^* = \frac{-\gamma + \kappa T - \frac{\kappa}{\varphi w}\left[(\beta - \varphi Y_n) + \delta\theta c_1(.)\right] + \left(\frac{\varphi w^2 + \kappa}{\varphi w^2}\right)\xi\theta(1 - F)}{\kappa} \tag{3.13}$$

Succinctly written, $H^* = H^*(Y_n, \theta, c_1(.), w, F)$ and $V^* = V^*(T, H, Y_n, \theta, c_1(.), w, F)$.

[17]The Hessian determinant is evaluated to ensure that V^* and H^* satisfy the sufficient second order condition for a maximum. It is found that the Hessian Matrix is negative definite and so satisfies the determinantal criteria for a maximum. See Appendix 3A for the complete solution.

It can be deduced from equation (3.12) that at a sufficiently low wage rate, a rise in w will lead to an increase in H^*. Likewise, when w is sufficiently high, a rise will lead to a fall in H^* and as w approaches infinity, H^* will approach zero. Thus, for certain combinations of the parameters, it is expected that equation (3.12) will admit backward-bending labour supply.

3.4.2 Comparative statics

3.4.2.1 *The effect of F on H*

The effect on the optimal labour supply given a change in how fairly wealth is distributed can be evaluated by differentiating equation (3.12) with respect to F. This yields:

$$\frac{\partial H^*}{\partial F} = \frac{\xi\theta - c_{12}(.)w}{\varphi w^2 - \delta\theta c_{11}(.)w}, \tag{3.14}$$

where $c_{12}(.) = c_{12}(Y_n + wH, 1 - F)$.

From examining equation (3.14), it is seen that the overall sign of $\frac{\partial H}{\partial F}$ is unclear --the denominator is clearly positive since, by concavity, $c_{11}(.) < 0$ but the sign of $c_{12}(.)$, the change in the marginal benefit of income due to a change in fairness, is unknown. Hence, *ceteris paribus*, labour supply is positively affected by increases

in the fairness of the wealth distribution if $c_{12}(.) \leq 0$. If however $c_{12}(.) > 0$, the effect of a change in F on H is ambiguous[18]. The results can be summarised in the following proposition:

Proposition 1: *If an increase in the level of fairness reduces the benefit of spending an extra unit of income to reduce cognitive dissonance or exposure to social problems, then as the distribution of wealth becomes more unfair (fair), the individual will decrease (increase) the number of hours worked.*

[18]The question then is: given that an increase in fairness reduces cognitive dissonance and the incidence of social problems, does an increase in fairness lead to a decrease in the benefit of spending an additional unit of income to reduce cognitive dissonance or exposure to social problems such as crime?. Intuitively, the answer to this question seems to be 'yes'. A possible rationale is that when the wealth distribution is unfair, individuals suffer cognitive dissonance and social problems are more prevalent (see Kelly (2000)). Hence, individuals will be motivated to spend some of their income on measures to reduce cognitive dissonance and to limit exposure to social problems. However, with an increase in fairness comes a reduction in cognitive dissonance and social problems. Consequently there is less need to spend to reduce cognitive dissonance and exposure to social problems. Therefore, it can be argued that the benefit from spending an extra unit of income to reduce cognitive dissonance and exposure to social problems is greater the greater is unfairness. The corollary follows that as the wealth distribution becomes more fair, the benefit from spending an additional unit of income to reduce cognitive dissonance and social problems is less.

Proof: See equations (3.14) ■

3.4.2.2 *The effect of F on V*

Differentiating equation (3.13), the effect of a change in the level of the fairness of the wealth distribution on the optimal amount of time spent on fairness-increasing activities is given by:

$$\frac{\partial V^*}{\partial F} = \frac{\delta\theta}{\varphi w}\left(\frac{c_{11}(.)(\xi\theta - c_{12}(.)w)w - c_{12}(.)(\varphi w^2 - \delta\theta c_{11}(.)w)}{\varphi w^2 - \delta\theta c_{11}(.)w} - \frac{(\varphi w^2 + \kappa)\xi}{\delta\kappa w}\right),$$

which is ambiguous.

The next section focuses on the empirical veracity of the theorised relationship between labour supply and the fairness of the wealth distribution.

3.5 Empirical Analysis

3.5.1 The data and sample

The data used here are five waves – waves 1, 3, 5, 7 and 10 – of the British Household Panel Survey (BHPS)[19], which is a nationally representative household-based survey of approximately 5,500 households (more than 10,000 individuals) randomly drawn from 250 different areas of the United Kingdom. The first wave interviews were conducted during the autumn of 1991, and annually thereafter during the same time period (see Taylor (1996) for further details on the BHPS).

To avoid the complications normally encountered when estimating female labour supply functions – not least data limitations in effectively modelling labour force participation – the empirical analysis is restricted to male workers[20]. Data are used only for individuals with valid information, who are aged 16 to 64 and are

[19]Panel data is preferred to cross-sectional data as it makes it possible to control for changes in job and individual characteristics including unobservable characteristics. Further, it reduces the problem of multicollinearity.

[20]This is commonly done in the literature and as Pencavel (1986) remarked "I know of no evidence from empirical studies of male labor supply (whether old, young, or prime-age men) that documents grievous biases from strategy of restricting estimation to the sample of workers and of not making any correction for this deliberate non-random selection of the observations".

currently employees, providing positive hours of work[21]. This results in a final sample of 12,097 person-year observations. Among male employees the average age is 37 years and the mean hourly wage is £8.84. Descriptive statistics for the set of variables used in the analysis are presented in Table 3.1. Table 3.1 also includes descriptive statistics on the non-job variables for the original male sample. A comparison of the two show that sample selection bias may be minimal. Further descriptive statistics for selected demographic characteristics are shown in Tables 3.3 and 3.4.

Beside the standard labour market analyses, the BHPS also allows for the study of the relationship between individuals' beliefs and their economic behaviour. The waves used here contain additional data on individuals' perception of how fairly wealth is distributed in the United Kingdom[22]. This is garnered from the following question:

> *...which answer... comes closest to how you feel about the following statement? Ordinary people get their fair share of the nation's wealth:*

[21]Self-employed individuals are excluded in order to avoid problems associated with the measurement of the hourly wage and hours of work for this group.

[22]It is this variable, which forms part of the rolling core of questions in the BHPS, that determines the waves used.

1. *Strongly Disagree*

2. *Disagree*

3. *Neither Agree/Disagree*

4. *Agree*

5. *Strongly agree*

This question requires individuals to evaluate the fairness of the wealth distribution and it forms the main explanatory variable of interest. Given the low percentage of those stating that they strongly agree (only 0.57 percent), categories 4 and 5 are grouped together as 'Agree'. Of the entire sample, 15.00 percent state that they strongly disagree with the statement, 49.91 percent state that they disagree, 15.28 percent state that they agree and 19.80 percent claim that they neither agree nor disagree with the statement[23]

[23]In 1991, the order of the fairness perception response choices presented to respondents on the showcard was slightly different to that of the other years. In 1991, the choices were ordered as follows: Strongly Agree, Agree, Neither Agree nor Disagree, *Disagree*, Strongly Disagree. In the other years, they were in the following order: Strongly Agree, Agree, Neither Agree nor Disagree, Strongly Disagree, *Disagree*. Given that the last two categories are combined, this variation in ordering is not expected to have any appreciable effect on the empirical findings. Another slight difference in the information preceding the eventual question should be noted. The question was read out as follows in 1991: "*Which answer off the card (V1) comes closest to how you feel about*

Following from the theoretical model, it is assumed that voluntary work is the key fairness-increasing activity. However, an unfortunate limitation of the data is that there is no adequate information on the time individuals spend engaged in voluntary work[24]. Hence, it is not possible to test the exact transmission mechanism between F and H.

A valuable aspect of the sampled data is that they span a period within which two different political parties assumed power in the UK – the Conservative Party was succeeded by the Labour Party in 1997 after 18 consecutive years in office. This is of importance because it offers reasons to believe that there is variation in the

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the following statement? Ordinary people get their fair share of the nation's wealth" and in the other years, it was read out as: "*People have different views about society. I'm going to read out some things people have said about Britain today and I'd like you to tell me which answer off the card (30) comes closest to how you feel about each statement. Ordinary people get their fair share of the nation's wealth*". It is held here that the added information read out to respondents in the years 1993, 1995, 1997, and 2000 is not of an influential nature and since there is no difference in the actual question, the findings are unlikely to be significantly compromised.

[24]For the first four waves used here, the specific question on voluntary work focuses only on groups registered as a 'Voluntary Service Group'. It does not account for the many other groups and individuals that participate in voluntary work. Moreover, the percentage of individuals responding is quite low (only 2.5 percent) and upon inspection is not sufficient enough to yield precise estimates.

data, which is necessary to carry out meaningful analysis. Individuals' perception of how fairly wealth is distributed is likely to have changed given that the political persuasions of these opposing parties are associated with different social policies. Changes in male employees' perception of the fairness of the wealth distribution over the years are shown in Table 3.4. The figures indicate that there is a reasonable degree of variation. It is seen that when the left came into power in 1997, there was a noticeable increase in the proportion of men who agreed that wealth is fairly distributed in the UK. This was matched by a marked decline in the proportion who disagreed that it is, although in 2000 that proportion increased slightly relative to 1997. The proportion of those who hold a neutral opinion on the fairness of the wealth distribution has fluctuated over time. These individuals are probably more prone to change their opinion on the fairness of the wealth distribution than those who hold a firm opinion. In general, the same pattern is evident for both the unmarried and married male sub-samples though not strictly so[25].

The dependent variable is actual weekly hours of work. On average, men work 39 hours a week as shown in Table 3.5 and this remains relatively constant over

[25]In contrast to a fall between 1993 and 1995 for the entire sample, there is a rise in the proportion of those who agree that wealth is fairly distributed for the unmarried sub-sample. For the married sub-sample, there is rise in the proportion between 1993 and 1995 of those who strongly disagree that wealth is fairly distributed whereas for all male employees there is a fall.

time. Thus, *prima facie*, there is no reason to suppose that fairness perceptions of the wealth distribution of the wealth distribution and hours of work move in tandem over time.

However, from Figure 3.1 it can be seen that there is a positive relationship between the perception of the fairness of the wealth distribution and the labour supply of men. Male employees who believe that wealth is fairly distributed work, on average, the most hours while those who strongly disagree work, on average, the least. As is seen from the graph, this relationship is especially strong for married male employees.

In short, a cursory glance at the raw data leads to the preliminary conclusion that for male employees, opinions of the fairness of the wealth distribution is positively correlated with labour supply. This is, however, a crude analysis of the data and it is possible that the observed relationship could be explained by other mechanisms. A formal empirical analysis is presented in the next section.

3.5.2 Model specification and estimation

From the theoretical model, the reduced form hours equation, for individual i at time t, is assumed to be approximated by the following linear form[26]:

$$H_{it} = w_{it}\beta_1 + F_{it}\beta_2 + \mathbf{X}_{it}\mathbf{\Gamma} + \alpha_i + u_{it}, \qquad (3.15)$$

$$i = 1, ..., N;\ t = 1, ..., T;$$

where H_{it} is actual weekly hours of work, and w_{it} is the natural logarithm of the gross hourly wage rate. The variable F_{it} represents the individual's opinion on how fairly wealth is distributed and the other exogenous variables, both time-varying and time-invariant, are contained in the 1 x k vector $\mathbf{X}_{it}$[27] with β_1, β_2, and $\mathbf{\Gamma}$ being the parameters to be estimated. The time-invariant random error term, α_i, captures the effects of unobservable individual-specific heterogenous characteristics. The idiosyncratic error term, given by u_{it}, is assumed to be independently identically distributed ($i.i.d$) with mean zero and variance σ^2. As is customarily assumed, $E(u|\mathbf{Z}_{i1}, ..., \mathbf{Z}_{iT}, \alpha_i) = 0$, where $\mathbf{Z} = [w, F, \mathbf{X}]$.

[26] Although it is based on rather restrictive assumptions, this type of labour supply function is probably the most popular in the empirical literature.

[27] The variables included in $\mathbf{X}$ are guided by economic theory and data availability. These are age and its square, non-labour income, household size, managerial status, job term, union recognition, marital status, health status, the unemployment rate and the usual intercept term.

3.5.2.1 *Unobserved Heterogeneity*

An important issue that must be addressed to ensure consistent and efficient parameter estimates is the relationship between the unobserved individual heterogeneity term and the observed explanatory variables. If α_i is arbitrarily correlated with the observed explanatory variables, a fixed effects estimation approach will yield consistent and efficient estimates but the GLS (random effects) estimator would be inconsistent. On the other hand, if $E(\alpha_i|\mathbf{Z}) = E(\alpha_i) = 0$, that means α_i is orthogonal to the observed explanatory variables, both a random effects estimation and a fixed effects estimation would give consistent and efficient estimates but the within-group (fixed effects) estimator would be inefficient. Therefore, under the null hypothesis that α_i is uncorrelated with the observable explanatory variables, the two estimators should not differ systematically.

Hausman (1978) proposed a test based on the difference between the two estimators to determine which of the methods of estimation is most appropriate. To illustrate, let δ_{FE} be the 1 x m vector of within-group estimates on the time-varying observables and likewise let δ_{RE} be the 1 x m vector of GLS estimates on the time-varying observables. Then, the H statistic is given by

$$H = \left[\hat{\delta}_{FE} - \hat{\delta}_{RE}\right]' \left[\hat{cov}(\hat{\delta}_{FE}) - \hat{cov}(\hat{\delta}_{RE})\right]^{-1} \left[\hat{\delta}_{FE} - \hat{\delta}_{RE}\right] \qquad (3.16)$$

and is distributed $\chi^2_{(m)}$ where m denotes the degrees of freedom. The terms $\hat{cov}(\hat{\delta}_{FE})$ and $\hat{cov}(\hat{\delta}_{RE})$ are consistent estimates of the asymptotic covariance matrices of δ_{FE} and δ_{RE} respectively. The implementation of this tests yields $\chi^2_{(22)} = 154.48$, which against the 10 percent critical value of 30.81 leads to a rejection of the random effects model[28]. Hence, the analysis employs a fixed effects model.

For the case of the linear fixed effects specification[29] this requires transforming equation (3.15) by first averaging all variables over $t = 1, ..., T$ to get the cross-section equation:

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[28]The random effects model is also rejected at the 1 percent and 5 percent significance level.

[29]It should borne in mind that as in the random effects specification, the α_is are still regarded as random in the fixed effects linear model (see Mundlak (1978)) but in contrast, they are treated as parameters to be estimated.

$$\bar{H}_i = \bar{w}_i\beta_1 + \bar{F}_i\beta_3 + \bar{\mathbf{X}}_i\boldsymbol{\Gamma} + \alpha_i + \bar{u}_i \qquad (3.17)$$

$$i = 1, ..., N;\ t = 1, ..., T;$$

$$\text{where } \bar{H}_i = \frac{1}{T}\sum_{t=1}^{T} H_{it},$$

$$\bar{w}_i = \frac{1}{T}\sum_{t=1}^{T} w_{it},\ \bar{F}_i = \frac{1}{T}\sum_{t=1}^{T} F_{it},$$

$$\bar{\mathbf{X}}_i = \frac{1}{T}\sum_{t=1}^{T} X_{it}, \text{ and } \bar{u}_i = \frac{1}{T}\sum_{t=1}^{T} u_{it}$$

Equation (3.17) is then subtracted from equation (3.15). This gets rid of the heterogeneity and gives the fixed effects estimating equation:

$$H_{it} - \bar{H}_i = (w_{it} - \bar{w}_i)\beta_1 + (F_{it} - \bar{F}_i)\beta_3 + (\mathbf{X}_{it} - \bar{\mathbf{X}}_i)\boldsymbol{\Gamma} + (u_{it} - \bar{u}_i) \qquad (3.18)$$

$$i = 1, ..., N;\ t = 1, ..., T$$

By using fixed effects estimation, it is possible for the necessary orthogonality condition to hold (that is, $E(\alpha_i|\mathbf{Z}_{it}) = 0$) while still being able to allow for $E(\alpha_i|\mathbf{Z}_{i1}, ..., \mathbf{Z}_{iT})$ to be any function of the $\mathbf{Z}$s. This ability to provide a more robust answer to the omitted variables problem *vis-à-vis* random effects estimation is a very attractive advantage of fixed effects estimation. Moreover, the problem

of sample selection bias is generally presumed to be less of a concern since α_i is removed from the estimating equation thereby eliminating the drawback of any correlation with u_{it} (see Vella (1998))[30]. Given this and the information in Table 3.1, which shows a very close similarity between the descriptive statistics for the sample of male employees and the original male sample, it will be assumed that sample selection bias is not a cause for concern here.

3.5.2.2 *The endogeneity of wages*

It is widely acknowledged that wages may be endogenous in an hours equation. Consequently, the ordinary least squares (OLS) estimate will be biased and the consistency of the other estimators may be affected. Here, two reasons for this possible endogeneity are that: (1) hourly wages is not reported directly and must be derived by dividing labour income by hours worked. Therefore, any measurement errors in hours may give rise to what is referred to by Borjas (1980) as a 'division bias'. In other words, a downward bias to the estimated wage coefficient as a result of spurious correlation between hourly wage, w_{it} and the error term, u_{it}, in the hours equation may emerge. (2) unobservable characteristics that influence wages may be correlated with unobservable characteristics that affect hours of

[30]Nonetheless, if the idiosyncratic error term in a labour force participation equation is correlated with u_{it}, selectivity bias will not necessarily be mitigated by fixed effects estimation.

work in the same direction. For instance, individuals with high aspirations may have higher wages and such individuals may also enjoy working[31]. A regression-based test for endogeneity confirmed here that the wage is endogenous in the hours equation[32].

To account for the endogeneity of wages, the instrumental variables (IV) technique is used. This involves finding an instrument G_{it} that is correlated with wages but not directly associated with hours of work. If this condition is met, the IV estimate of the coefficient on wages is consistent. Moreover, the greater the correlation between wages and G_{it}, the more efficient the estimates.

The choice of appropriate instruments remains controversial. Most instruments used to control for the endogeneity of wages in an hours equation are often thought to be of poor quality. Usually, these instruments are weak predictors of wages or

[31]For a further brief account on why wages are considered endogenous in the labour supply model, see Biddle and Zarkin (1989).

[32]This test was proposed by Hausman (1978, 1983). It was carried out by first performing a fixed effects regression of w_{it} on F_{it}, $\mathbf{X}_{it}$, α_i, and an instrument, which is discussed shortly, and obtaining the residuals υ_{it}. Thereafter, a fixed effects regression of H_{it} on w_{it}, F_{it}, $\mathbf{X}_{it}$, and υ_{it} was conducted. The coefficient on υ_{it} was then tested for significance. The T-statistic for the coefficient was 0.048, which at the 5 percent significance level, confirms that wage is endogenous in the hours equation.

it is not clear that they should be excluded from the hours equation. Typically, studies use years of education, age (and its square), and experience (and its square) as instruments. However, as Pencavel (1986) noted, education does have an effect on hours of work. Furthermore, the strong age profile normally found in hours of work equations make age and experience questionable instruments. Certainly, it is extremely difficult to find the perfect instrument. Instead, researchers must endeavour to use instruments that meet the requirements of validity as recommended by Bound *et al* (1995) and Staiger and Stock (1997). To this end, in this study, the life expectancy of men at age 65 is used as an instrument for wages[33]. It is expected that there will be an upward pressure on current wage as life expectancy at retirement age increases. This is because pension contribution would need to rise to finance consumption after retirement. This would have implications for wage bargaining and in general the wage package offered by firms. Beyond any effect through wages, life expectancy at 65 is not thought to have a direct impact on current weekly hours of work and is assumed to be uncorrelated with u_{it}. That is to say, it is assumed that life expectancy at age 65 affects the demand for labour but not the supply thus making identification possible.

[33]Data on the life expectancy of men at age 65, defined as 'the average number of years which a 65 year old person could be expected to live if the rates of mortality at each age were those experienced in that calendar year', was obtained from the Office of National Statistics via the website www.statistics.gov.uk.

For validity, the life expectancy variable must satisfy two main requirements. Firstly, it must be strongly correlated with wages. Secondly, beyond its impact through wages, it should be uncorrelated with labour supply[34].

The test results support the appropriateness of life expectancy at age 65 as an instrument for wages. The R^2 for the correlation between wages and life expectancy at age 65 is 0.139. Relative to what is normally reported in the literature for the correlation between the endogenous variable and the instrument, this value is quite high and suggests that life expectancy at 65 should not be regarded as a weak instrument. The F-statistic for the effect of life expectancy at 65 in the wage equation is 19.73 against the 5 percent critical value of 3.84. This exceeds the benchmark value of 10 proposed by Staiger and Stock (1997) and indicates negligible finite-sample bias[35]. Further, the R^2 for the correlation between weekly hours and life expectancy at age 65 is 0.00 and in the hours equation, the F-statistic is 0.46 against the 5 per cent critical value of 3.84.

[34]In technical jargon, life expectancy should enter the first stage regression but not the second stage regression.

[35]Indeed, the bias of the IV estimates *vis-à-vis* the OLS estimates is practically zero since the bias is proportional to the number of instruments minus the number of endogenous variables.

3.5.2.3 *Testing for the endogeneity of fairness perceptions*

Given the importance of fairness perceptions of the wealth distribution in this analysis, it is prudent to check whether or not it is endogenous. If it is and it is not accounted for, the estimates could be seriously biased and the coefficients on the other variables might also be affected.

Two plausible reasons why fairness perceptions of the wealth distribution might be endogenous in the labour supply equation are: (1) the number of hours worked may influence fairness perceptions of the wealth distribution. For example, when individuals work longer hours they may be prone to greater fatigue and this may change their perceptions of the fairness of the wealth distribution and (2) the possible existence of measurement errors may cause a spurious correlation between F_{it} and u_{it}.

Before the test is conducted, a suitable instrument for fairness perceptions of the wealth distribution must be found. The instrument used is a variable describing individuals' opinion on whether 'there is one law for the rich and one for the poor'. This is based on the assumption that opinions on whether rich and poor individuals are treated differently will shape perceptions of the fairness of the wealth distribution but will not affect labour supply. This is substantiated by the results

from the following validity checks[36]. The partial correlation (R^2) between the fairness perceptions of the wealth distribution and individuals' opinion on whether 'there is one law for the rich and one for the poor' is 0.040. Such a low value indicates that this instrument is relatively weak and must have, as recommended by Staiger and Stock (1997), an F-statistic that is no less than 10 in the fairness perception equation in order for it to meet the conditions for validity. Fortunately, the F-statistic is 67.04. This far exceeds the benchmark value. In addition, the instrument must be insignificant in the labour supply equation. The partial correlation (R^2) between labour supply and individuals' opinion on whether 'there is one law for the rich and one for the poor' is 0.001 and the F-statistic for this instrument in the labour supply equation is 0.72. In sum, the conditions for validity are satisfied: individuals' opinion on whether 'there is one law for the rich and one for the poor' are correlated with fairness perceptions of the wealth distribution but are uncorrelated with labour supply. Therefore, it is concluded that individuals' opinion on whether 'there is one law for the rich and one for the poor' is a valid instrument for fairness perceptions of the wealth distribution.

The test proceeds within the fixed effects framework. First, F_{it} is regressed on w_{it}, $\mathbf{X}_{it}$, α_i, and the variable describing individuals' opinion on whether 'there is

[36]These are checks recommended by Bound *et al* (1995) and Staiger and Stock (1997) to determine the validity on an instrument.

one law for the rich and one for the poor'. Then the residual, ς_{it}, is used as an additional regressor in equation (3.18). This yields the following estimating equation:

$$H_{it} - \bar{H}_i = (w_{it} - \bar{w}_i)\beta_1 + (F_{it} - \bar{F}_i)\beta_3 + (\mathbf{X}_{it} - \bar{\mathbf{X}}_i)\boldsymbol{\Gamma} + (\varsigma_{it} - \bar{\varsigma}_i)\pi + (u_{it} - \bar{u}_i) \qquad (3.19)$$
$$i = 1, ..., N;\ t = 1, ..., T$$

If π is insignificant, then F_{it} can be regarded as exogenous. The T-statistic on π is 0.21 which means that $\pi = 0$ cannot be rejected. Thus, it is safe to assume that the variable representing fairness perceptions of the wealth distribution is not endogenous in the hours equation and that the possible problems of time-varying unobservables and measurement error are not cause for concern.

3.5.3 Results

3.5.3.1 *Main Results*

For comparative purposes, the OLS results for equation (3.15) are presented along with the IV estimates.

OLS within-group Estimates

The OLS within-group estimates in Table 3.6 corroborates the conclusion that was drawn from the tabulations of the raw data – there is a positive relationship be-

tween the labour supply of male employees and their perceptions of the fairness of the wealth distribution. That is to say, male employees are likely to work significantly less hours a week as perceptions of the fairness of the wealth distribution becomes more unfavourable.

The estimates on the fairness perception dummies are highly significant and reveal that, *ceteris paribus*, relative to male individuals who believe that wealth is fairly distributed, those who strongly disagree that it is, will work on average 0.746 hours (or approximately 45 minutes) less a week and those who disagree, will work on average 0.614 hours (or approximately 37 minutes) less a week. For those male workers who neither believe wealth is unfairly distributed nor that it is fairly distributed, weekly hours, on average, will be less than that of those who agree by 0.497 hours (or approximately 30 minutes). It can therefore be concluded that the average male employee will reduce (increase) weekly hours of work by 30 minutes or more as perceptions of the wealth distribution becomes more unfavourable (favourable).

Looking at the estimates for other variables to check consistency with standard findings, it is found that the familiar inverted u-shaped age profile exists. Weekly hours of work rise with age, reaching a peak at age 44 and then declining

thereafter[37].

For both wages and non-labour income there is a negative relationship with hours of work. Intuitively, as non-labour income increases, the need for working diminishes insofar as the individual is able to maintain consumption by working less hours and will wish to do so since working tends to reduce utility. On the contrary, wages would normally be expected to be positively related to hours of work. However, it is not unusual in empirical studies of labour supply to find that log wage enters the hours equation negatively as it does here. One explanation is that individuals are on the backward bending portion of their labour supply curve. Another could be that the endogeneity of wages in the hours equation may be the cause of this downward bias in the estimate. This possibility is addressed by looking at the IV results.

IV within-group Estimates

To address the concern that the OLS within-group estimates may be biased, the log wage is instrumented in the hours equation. The first stage wage regression is presented in Table 3.B1 of Appendix 3B. The IV within-group estimates are shown in Table 3.6. The coefficients on the fairness perception dummies are still

[37]It should be noted that this is so while holding wage fixed, which itself exhibits a u-shaped age profile.

significant and negative as expected. Relative to those who agree that wealth is fairly distributed, male workers who strongly disagree will work on average 0.590 less hours (or approximately 35 minutes less) a week. Similarly, for male workers who disagree that wealth is fairly distributed hours of work will be less than that of those who agree that wealth is fairly distributed by 0.622 hours (or approximately 37 minutes). In terms of minutes, this is roughly the same as the corresponding OLS estimate. In addition, male workers with no firm opinion on the fairness of the wealth distribution – they neither disagrees nor agrees that wealth is fairly distributed – can be expected to work, on average, 0.521 hours (31 minutes) less a week than those who believe that wealth is fairly distributed. This too, in terms of minutes, is very close to the corresponding OLS estimate.

There is a slight suggestion from the IV estimates that weekly hours of work do not decline continuously as perceptions of the wealth distribution becomes successively unfavourable. It can be seen that compared to those who agree that wealth is fairly distributed, male employees who disagree will reduce weekly hours by 2 minutes more than those who strongly disagree. However, this difference is quite small and possibly insignificant.

In sum, the IV within-group estimates lead to the same conclusion as the OLS within-group estimates, which is that the average male employee will decrease (increase) his weekly hours of work as the wealth distribution becomes more unfair

(fair) by as much as 30 minutes or more.

In the case of the other variables, it is found that the coefficient on age and age squared have the same sign as those in the OLS estimation but they are insignificant. Non-labour income on the other hand still has a negative and significant influence on weekly hours of work. Not surprising, the IV estimate of log hourly wage is greater than the OLS estimate and has the expected positive sign but it is insignificant.

In general, the IV standard errors are much greater than the OLS standard errors. This is not uncommon with IV estimation. Nonetheless, the estimates are still highly precise and are consistent whereas, despite being more precise, the OLS estimates are inconsistent.

3.5.3.2 *Additional Results*

The sample is split into unmarried[38] and married male employees to determine whether there are marked differences between the two[39]. Arguably, unmarried in-

[38]Unmarried individuals are those who are either separated, divorced, widowed, or have never married.

[39]Age subsamples were also considered (<25, 25–34, 35–44, 45–54, ≥55) and no strong evidence that age moderates the impact of fairness perceptions on labour supply behaviour was found. The

dividuals may have less home commitments and hence more flexibility with respect to their weekly hours of work. Therefore, hours of work of unmarried individuals may be more responsive to perceptions of how fairly wealth is distributed. IV estimates are presented in Table 3.7 and the first stage wage regressions are shown in Table 3.B2 of Appendix 3B.

To begin, it is important to check that life expectancy at age 65 remains a valid instrument for wages in each subsample. The R^2 for the correlation between wages and life expectancy at age 65 is 0.216 for unmarried male employees and 0.077 for married employees. Based on this, it appears that life expectancy may be a weak instrument in the case of married male employees but not so for unmarried male employees.

Given the weak correlation between life expectancy at age 65 and log hourly wage in the subsample of married male employees, a small correlation between life expectancy at age 65 and weekly hours can give rise to a larger inconsistency in the IV estimates compared to the OLS estimates for this group. Consequently, unlike

subsamples were quite small but this was again supported by the insignificance of the interactions between age and fairness perceptions for the entire sample. Interactions between wage and the fairness perception dummies were also tested for significance. The results revealed that the impact of fairness perceptions on labour supply is not dependent on wages. Given the insignificance of these results, they are not reported here.

for unmarried male employees, it is necessary to check that the F-statistic on life expectancy at age 65 in the hourly wage equation for married male employees is no less than the benchmark value of 10 suggested by Staiger and Stock (1997). For the subsample of married male employees, the F-statistic is 15.48. This implies that finite sample bias is negligible[40]. In the case of unmarried male employees, the F-statistic is 1.95. Since the correlation between life expectancy at age 65 and log hourly wage is relatively high, finite sample bias may not be a significant problem[41]. It can therefore be concluded that it is possible for reliable conclusion to be drawn from the IV estimates in both the subsamples of unmarried and married male employees.

The results show that the labour supply of unmarried male employees may indeed be more responsive to perceptions of the fairness of the wealth distribution. Unmarried male employees who strongly disagree that wealth is fairly distributed will work on average 1.105 hours (or approximately 1 hour and 6 minutes) less than those who agree that it is. A similar reduction in weekly hours occurs for those who disagree. They are likely to work, on average, 1.099 hours (or approximately

[40]Moreover, the R^2 for the correlation between life expectancy at age 65 and weekly hours for the subsample of married male employees is 0.000.

[41]For the correlation between life expectancy at age 65 and weekly hours for the subsample of unmarried male employees, the R^2 is 0.007.

1 hour and 6 minutes) less than unmarried male employees who agree that wealth is fairly distributed. For those who neither agree nor disagree that wealth is fairly distributed hours of work will be, on average, less than that of those who agree by 0.906 hours (or approximately 54 minutes) a week.

Looking at married male employees, it is seen that the estimates are not very precise. For the fairness perception dummies, the signs on the coefficients are negative as expected and are smaller in magnitude than those for unmarried male employees. However, only the coefficient for those who disagree that wealth is fairly distributed is significant and this is so only at the 10 percent level. According to the estimate, when compared to those who agree that wealth is fairly distributed, married male employees who disagree, work on average, 0.566 hours (or approximately 34 minutes) less a week.

Taken together, the findings show that there are important regularities in the data that are consistent with a positive relationship between labour supply and fairness perceptions of the wealth distribution.

3.6 Conclusions

The literature has focused primarily on how the violation of a social norm affects the economic behaviour of the individual when the individual is the one in violation

of the norm or the target of the violation. Little is known of how the behaviour of individuals responds to a more global violation of a social norm. That is, the violation of a norm in cases where the individual is not necessarily directly affected.

Insofar as individuals wish to maintain the norm of fairness in society and suffer a loss of psychic income whenever the norm of fairness is violated, it is likely that an unfair wealth distribution will motivate them to engage in fairness-increasing activities even though they are not themselves directly affected. The prevalence of altruistic behaviour such as donations and voluntary work attests to individual's concern for the well-being of others. Interestingly, survey evidence indicates that voluntary work has increased alongside increasing wealth inequality.

This paper sets out to determine whether individuals' overall concern for fairness in society influences their labour market behaviour. To this end, a theoretical model was developed to explain how the fairness of the wealth distribution may affect the labour supply decision of individuals. It is argued that unfairness in society motivates individuals to engage in voluntary activities, which draw time away from labour market work. Consequently, it is proposed that labour supply will fall as the wealth distribution becomes more unfair.

This hypothesis is supported by the empirical findings. It is found that individual labour supply is positively related to the fairness of the wealth distribution.

Using a fixed effects estimation method and controlling for the endogeneity of wages, the results reveal that, on average, male employees who believe that wealth is not fairly distributed or who hold no firm opinion as to whether or not wealth is fairly distributed work about half an hour less a week than those who believe that it is.

Looking only at unmarried male employees, it is found that, on average, the reduction in hours is almost double that for the entire sample of male employees. When married male employees are considered, it is found that only those who disagree that wealth is fairly distributed relative to those who agree, that have a statistically significant reduction in weekly hours. In this case, the reduction is similar to that found for the entire sample of male employees.

One implication of the results is that, *ceteris paribus*, if wealth becomes more unfairly distributed, output and consequently productivity may be adversely affected especially if individuals reduce hours of work in favour of voluntary work rather than relaxation. For that reason, the results are suggestive as to why more egalitarian societies may enjoy higher productivity levels than less egalitarian societies. Governments should be mindful of this possible effect if wealth is allowed to be unfairly distributed.

Figure 3.1: Average weekly hours and fairness perceptions of the wealth distribution.

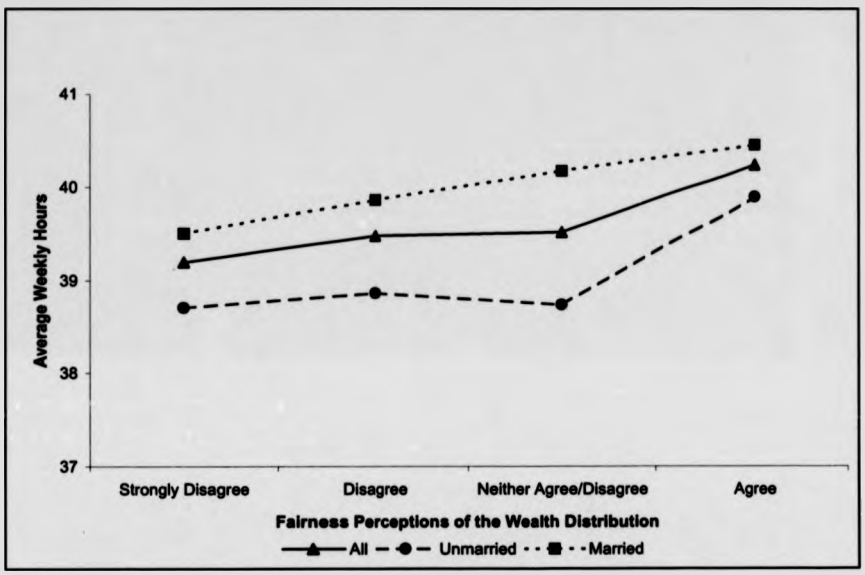

Table 3.1: Descriptive Statistics

Variable	Selected Sample Mean (Std Dev)	Original Sample Mean (Std Dev)
Age	37.341	37.990
	(11.564)	(13.339)
Monthly non-labour income (£)	12.637	30.703
	(41.928)	(73.471)
Hourly Wage (£)	8.992	
	(5.254)	
Fairness Opinion of the Wealth Distribution (4)	2.354	2.377
	(0.913)	(0.942)
Marital Status (5)	2.425	2.564
	(1.835)	(1.862)
Household Size	3.082	3.109
	(1.277)	(1.360)
Health Status (5)	1.916	2.037
	(0.796)	(0.903)
Weekly Hours of Work	39.561	
	(7.580)	
Managerial Status (3)	2.332	
	(0.842)	
Job Term (3)	1.077	
	(0.354)	
Union Recognition (2)	0.499	
	(0.500)	
Unemployment Rate	6.502	6.586
	(2.540)	(2.535)
Sample size (person-year observations)	12097	20331

Notes:(1) Std Dev = Standard Deviations. (2) Wage and non-labour income are measured in 1996 prices.

Table 3.2: Mean weekly hours for selected individual characteristics

Variable	
All	39.561
Race:	
White	39.604
Non-white	37.490
Marital Status:	
Unmarried	38.966
Married	39.957
Age:	
16–24 years	38.675
25–34 years	39.967
35–44 years	39.837
45–54 years	39.842
55–64 years	38.257
Income (£):	
First quartile	37.497
Second quartile	40.076
Third quartile	39.952
Fourth quartile	40.717

Table 3.3: Mean weekly hours by fairness perceptions of the wealth distribution

Variable	Strongly disagree	Disagree	Neither Disagree/Agree	Agree
All	39.198	39.480	39.519	40.239
Race:				
White	39.236	39.546	39.515	40.286
Non-white	35.944	36.391	40.600	39.353
Marital Status:				
Unmarried	38.708	38.865	38.740	39.898
Married	39.507	39.864	40.176	40.454
Age:				
16–24 years	38.854	38.406	38.570	39.497
25–34 years	39.181	39.793	40.295	40.842
35–44 years	39.133	39.854	39.753	40.653
45–54 years	39.850	39.729	39.525	40.542
55–64 years	38.408	38.360	37.729	38.206
Income (£):				
First quartile	37.582	37.277	37.476	38.129
Second quartile	39.941	39.923	40.273	40.622
Third quartile	39.392	39.974	39.913	40.553
Fourth quartile	40.387	40.657	40.418	41.361

Table 3.4: Fairness opinion of the wealth distribution in the UK over time

All	1991	1993	1995	1997	2000	*Total*
Strongly Disagree	22.27	16.61	15.53	10.65	12.06	15.00
Disagree	40.13	52.21	55.29	50.06	51.92	49.91
Neither Disgree/Agree	16.38	17.91	16.43	25.88	20.73	19.80
Agree	21.22	13.27	12.74	13.41	15.29	15.28
Total	100.00	100.00	100.00	100.00	100.00	100.00
Unmarried	1991	1993	1995	1997	2000	*Total*
Strongly Disagree	20.57	18.41	14.93	10.09	12.22	14.50
Disagree	39.03	47.03	52.86	49.15	50.10	48.06
Neither Disgree/Agree	20.57	21.67	19.15	27.55	22.65	22.65
Agree	19.83	12.89	13.06	13.21	15.03	14.79
Total	100.00	100.00	100.00	100.00	100.00	100.00
Married	1991	1993	1995	1997	2000	*Total*
Strongly Disagree	23.20	15.56	15.94	11.07	11.95	15.34
Disagree	40.73	55.23	56.93	50.75	53.27	51.15
Neither Disgree/Agree	14.09	15.72	14.61	24.63	19.31	17.90
Agree	21.98	13.50	12.52	13.56	15.47	15.61
Total	100.00	100.00	100.00	100.00	100.00	100.00

Columns may not sum due to rounding.

Table 3.5: Average Weekly Hours Over Time

Year	All	Unmarried	Married
1991	39.82	39.21	40.16
1993	39.44	38.85	39.79
1995	39.46	38.74	39.95
1997	39.60	39.12	39.95
2000	39.48	38.90	39.92

Table 3.6: The effect of fairness perceptions of the wealth distribution on hours of work

Weekly Hours	*OLS within group estimates*		*IV within group estimates*	
Age	1.268***	(0.087)	0.259	(0.567)
Age Squared/100	-1.431***	(0.101)	-0.387	(0.587)
Household size	-0.360***	(0.085)	-0.260**	(0.109)
Log Hourly Wage	-5.823***	(0.249)	3.241	(5.026)
Monthly non-labour Income	-0.008***	(0.002)	-0.005**	(0.002)
[a]Managerial Status: Supervisor	-0.788***	(0.242)	-0.462	(0.321)
[a]Managerial Status: Non-Managerial	-1.803***	(0.239)	-0.951*	(0.539)
[b]Job Term: Temporary Contract	-4.675***	(0.499)	-3.722***	(0.760)
[b]Job Term: Fixed Term	-1.878***	(0.434)	-1.282**	(0.579)
[c]Union Recognition	-0.742***	(0.213)	-1.602*	(0.530)
Regional unemployment Rate	-0.064	(0.044)	0.042	(0.075)
Fairness of wealth distribution:				
[d]Strongly disagree	-0.746***	(0.281)	-0.590*	(0.320)
[d]Disagree	-0.614***	(0.221)	-0.622***	(0.242)
[d]Neither Agree/Disagree	-0.497**	(0.231)	-0.521**	(0.254)
Prob > F		0.000		0.000
R^2		0.111		N/A
F-statistic (excluded instruments)				19.73
R^2 (excluded instruments)				0.139
Number of observations [individuals]	12,097 [5,373]		12,097 [5,373]	

Notes: (1) ***, **, * denotes significance at the 1% level, 5% level, and the 10% level respectively. (2)Marital Status, and Health Status dummies are included. (3) Standard errors are in parenthesis. (4) Omitted categories: (a) Manager, (b) Permanent Job, (c) No Union Recognition (d) Agree.

Table 3.7: The effect of fairness perceptions of the wealth distribution on hours of work for different marital status: *IV Within-group Estimates*

Weekly Hours	*Unmarried*		*Married*	
Age	1.876	(1.898)	-0.351	(0.587)
Age Squared/100	-2.316	(1.994)	0.273	(0.596)
Household size	-0.391**	(0.183)	-0.344*	(0.185)
Log Hourly Wage	-6.586	(14.461)	8.236	(6.474)
Monthly non-labour Income	-0.014***	(0.005)	-0.002	(0.003)
[a]Managerial Status: Supervisor	-0.845	(0.828)	-0.277	(0.409)
[a]Managerial Status: Non-Managerial	-1.457	(1.480)	-0.823	(0.709)
[b]Job Term: Temporary Contract	-4.027***	(1.263)	-3.700***	(1.399)
[b]Job Term: Fixed Term	-1.877***	(0.767)	-0.785	(1.026)
[c]Union Recognition	-1.075	(1.284)	-1.800**	(0.745)
Regional unemployment Rate	-0.059	(0.145)	0.107	(0.102)
Fairness of wealth distribution:				
[d]Strongly Disagree	-1.105*	(0.656)	-0.589	(0.429)
[d]Disagree	-1.099***	(0.432)	-0.566 *	(0.328)
[d]Neither Agree/Disagree	-0.906**	(0.445)	-0.278	(0.354)
Prob > F		0.000		0.000
R^2				
F-statistic (excluded instruments)		1.95		15.48
R^2 (excluded instruments)		0.216		0.077
Number of observations [individuals]	4,834 [2,684]		7,263 [3,158]	

Notes: (1) ***, **, * denotes significance at the 1% level, 5% level, and the 10% level respectively. (2)Health Status, Occupation, and year dummies are included. (3) Standard errors are in parenthesis. (4) Omitted categories: (a) Manager, (b) Permanent Job, (c) Disagree.

Bibliography

[1] Adams, Stacy J., and William B. Rosenbaum (1962), "The Relationship of Worker Productivity to Cognitive Dissonance About Wage Inequities", *Journal of Applied Psychology*, 46(3):161–164.

[2] Adams, Stacy J. (1965), "Inequity in Social Exchange", *Advances in Experimental Social Psychology*, in L. Berkowitz (ed), pp. 267–299, New York: Academic press.

[3] Akerlof, George A. (1980), "A Theory of Social Custom, of Which Unemployment May be One Consequence", *The Quarterly Journal of Economics*, 94(4):749–775.

[4] Akerlof, George A. (1982), "Labor Contracts as Partial Gift Exchange", *The Quarterly Journal of Economics*, 97(4):543–569.

[5] Akerlof, George A., and Janet Yellen (1990), "The Fair Wage-Effort Hypothesis and Unemployment", *The Quarterly Journal of Economics*, 101(1):83–96.

[6] Amiel, Yoram, John Creedy, and Stan Hurn (1999), "Measuring Attitudes Towards Inequality", *Scandinavian Journal of Economics*, 105(2):255–283.

[7] Andrews, I.R. (1967), "Wage Inequity and Job Performance", *Journal of Applied Psychology*, 51(1):39–45.

[8] Ashenfelter, Orley, Richard Layard (1986), *Handbook of Labor Economics*, Vol 1, Amsterdam: North Holland.

[9] Becker, Gary S. (1965), "A Theory of the Allocation of Time", *The Economic Journal*, 75(299):493–517.

[10] Biddle, Jeff E., and Gary A. Zarkin (1989), "Choice Among Wage-Hours Packages: An Empirical Investigation of Male labor Supply", *Journal of Labor Economics*, 7(4):415–437.

[11] Borjas, George J., (1980), "The Relationship Between Wages and Weekly Hours of Work: The Role of Division Bias", *Journal of Human Resources*, 15(3):409–423.

[12] Bound, John, David A. Jaeger, and Regina M. Baker (1995), "Problems with Instrumental Variables Estimation When the Correlation Between the Instruments and the Endogenous Explanatory Variable is Weak", *Journal of the American Statistical Association*, 90(430):443–450.

[13] Carlsson, Fredrik, Dinky Daruvala, and Olof Johansson-Stenman (2003), "Are People Inequality Averse or Just Risk Averse?", Unpublished.

[14] Conway, Karen Smith, and Thomas J. Kniesner (1994), "Estimating Labor Supply with Panel Data", *Economics Letters*, 44:27–33.

[15] Corneo, Giacom and Hans Peter Grüner (2002), "Individual Preferences for Political Redistribution", *Journal of Public Economics*, 83:83–107.

[16] Cornwell, Christopher, Peter Schmidt, and Donald Wyhowski (1992), "Simultaneous Equations and Panel Data", *Journal of Econometrics*, 51:151–181.

[17] Cornwell, Christopher, Karen L. Tinsley, and Ronald S. Warren Jr. (2000), "Religious Background and the Labor Supply and Wages of Young Women", Unpublished.

[18] de Neubourg, Chris, and Maarten Vendrik (1994), "An extended Rationality Model of Social Norms in Labour Supply", *Journal of Economic Psychology*, 15:93–126.

[19] Elster, John (1998), "Emotions and Economic Theory", *Journal of Economic Literature*, 34:47–74.

[20] Epstein Gil S. and Uriel Spiegel (2001), "Natural Inequality, Production and Economic Growth", *Labour Economics*, 8:463–473.

[21] Fehr, Ernst, Georg Kirchsteiger, and Arno Riedl (1993), "Does Fairness Prevent Market Clearing? An Experimental Investigation", *Quarterly Journal of Economics*, 108(2):437–459.

[22] Fehr, Ernst, and Klaus Schmidt (1999), "A Theory of Fairness, Competition and Cooperation", *Quarterly Journal of Economics*, 114(3):817–868.

[23] Feldman, Daniel C. (2002), "Managers' Propensity to Work Longer Hours – A multilevel Analysis", *Human Resource Management Review*, 12:339–357.

[24] Fong, Christina (2001), "Social Preferences, Self-interest, and the Demand for Redistribution", *Journal of Public Economics*, 82:225–246.

[25] Fong, Christina, Samuel Bowles, and Herbert Gintis (2002), "Behavioral Foundations of Egalitarianism, Reciprocity, and Altruism", Unpublished.

[26] Föster, Michael, and Mark Pearson (2002), "Income Distribution and Poverty in the OECD Area: Trends and Driving Forces" *OECD Economic Studies*, No. 34, 2002/I.

[27] Galor, Oded, and Joseph Zeira (1993), "Income Distribution and Macroeconomics", *The Review of Economic Studies*, 60(1):35–52.

[28] Goodman, Alissa (2001), "Inequality and Living Standards in Great Britain: Some Facts", *The Institute for Fiscal Studies*, Briefing Note No.19.

[29] Greene, William H. (2000), *Econometric Analysis*, 4^{th} Edition, New Jersey: Prentice Hall International, Inc.

[30] Gronau, Rueben (1977), "Leisure, Home Production, and Work – The Theory of the Allocation of Time Revisted", *The Journal of Political Economy*, 85(6):1099–1124.

[31] Gronau, Rueben (1997), "The Theory of Home Production: The Past Ten Years", *Journal of Labor Economics*, 15(2):197–205.

[32] Hausman, Jerry A. (1978), "Specification Tests in Econometrics", *Econometrica*, 46:1251-1271.

[33] Hausman, Jerry A. (1983), "Specification and Estimation of Simultaneous Equation Models", *Handbook of Econometrics*, pg 391–448, Z. Griliches and M.D. Intriligator (ed), Volume 1 Amsterdam: North Holland.

[34] Heckman, James (1993), "What Has Been Learned About Labor Supply in the Past Twenty Years", *The American Economic Review*, 83(2):116–121.

[35] Kahneman, Daniel, Jack Knetsch, and Richard Thaler (1986b), "Fairness and the Assumptions of Economics", *Journal of Business*, 59(4):S285–S300.

[36] Kahneman, Daniel, Jack Knetsch, and Richard Thaler (1986a), "Fairness as a Constraint on Profit Seeking: Entitlements in the Market", *The American Economic Review*, 76(4):728–741.

[37] Kelly, Morgan (2000), "Inequality and Crime", *The Review of Economics and Statistics*, 82(4):530–539.

[38] Korzeniewicz, Roberto Patricio, and Timothy Patrick Moran (1997), "World-Economic Trends in the Distribution of Income", *American Journal of Sociology*, 102(4):1000–1039.

[39] Lee, Woojin and John E. Roemer (1998), "Income Distribution, Redistributive Politics, and Economic Growth", *Journal of Economic Growth*, 3:217–240.

[40] Levine, David I. (1992), "Piece Rates, Output Restriction, and Conformism", *Journal of Economic Psychology*, 13:473–489.

[41] Milanovic, Brian (2002), "True World Income Distribution, 1988 and 1993: First Calculation Based on Household Surveys Alone", *The Economic Journal*, 112:51–92.

[42] Mundlak, Yair (1978), "On The Pooling of Time Series and Cross Section Data", *Econometrica*, 46(1):69–85.

[43] Pencavel, John (1986), "Labour Supply of Men: A Survey", In *Handbook of Labour Economics*, (ed. O. Ashenfelter and R. Layard), Amsterdam: North-Holland.

[44] Persson, Torsten, and Guido Tabellini (1994), "Is Inequality Harmful for Growth", *The American Economic Review*, 84(3):600–621.

[45] Romer, David (1984), "The Theory of Social Custom: A Modification and Some Extensions", *The Quarterly Journal of Economics*, 99(4):717–727.

[46] Roy, Kakoli, and Susanne Ziemek (2000), "On The Economic of Volunteering", *ZEF Discussion Papers on Development Policy*, No. 31.

[47] Rutström, Elisabet E. and Melonie B. Williams (2000), "Entitlements and fairness: An Experimental Study of Distributive Preferences", *Journal of Economic Behavior and Organization*, 43:75–89.

[48] Sala-i-Martin, Xavier (2002), "The World Distribution of Income (Estimated From Individual Country Distributions)", unpublished.

[49] Staiger, Douglas, and James H. Stock (1997), "Instrumental Variables Regression with Weak Instruments", *Econometrica*, 65(3):557–586.

[50] Stutzer, Alois, and Rafael Lalive (2001), "The Role of Social Work Norms in Job Searching and Subjective well-Being", *IZA Discussion Paper*, No. 300.

[51] Taylor, M.F (ed. with J. Brice *et al*) (1996), *British Household Panel Survey User Manual Volumes A and B*, University of Essex, Colchester.

[52] Thaler, Richard H. (1985), "Mental Accounting and Consumer Choice", *Marketing Science*, 4(3):199–214.

[53] Thurow, Lester (1971), "The Income Distribution as a Pure Public Good", *The Quarterly Journal of Economics*, 85(2):327–336.

[54] Vella, Francis, (1998), "Estimating Models With Sample Selection Bias: A Survey", *Journal of Human Resources*, 33(1):127–169.

[55] Wooldridge, Jeffrey M. (2002), *Econometric Analysis of Cross Section and Panel Data*, United States: MIT.

3.7 Appendix 3A

The individual's maximisation problem is:

$$\underset{\{V,H\}}{Max}\ U = \alpha + \beta X - \frac{1}{2}\varphi X^2 + \gamma \dot{L} - \frac{1}{2}\kappa \dot{L}^2 - \delta\theta c(Y, 1-F) + \xi\theta(1-F)V,$$

subject to:

$$X \leq Y = Y_n + wH \quad \text{(income budget constraint)}$$

$$T = H + \dot{L} + V \quad \text{(time budget constraint)}$$

Substituting $L = T - H - V$ and $X = Y = Y_n + wH$ into the objective function, the first order conditions are given by:

$$\frac{\partial U}{\partial H} = \beta w - \varphi(Y_n + wH)w - \gamma + \kappa(T - H - V) + \delta\theta c_1(Y_n + wH, 1-F)w \leq 0$$

$$\frac{\partial U}{\partial V} = -\gamma + \kappa[T - H - V] + \xi\theta(1-F) \leq 0$$

and the interior solutions are:

$$H^* = \frac{(\beta - \varphi Y_n + \delta\theta c_1(.))w - \gamma + \kappa(T-V)}{\varphi w^2 + \kappa},$$

$$V^{*} = \frac{-\gamma + \kappa(T - H) + \xi\theta(1 - F)}{\kappa},$$

where $c_1(.) = c_1(Y_n + wH, 1 - F)$.

To ensure that V^* and H^* satisfy the sufficient second order condition for a maximum it is necessary to evaluate the Hessian determinant. The Hessian Matrix (A) is given by:

$$A = \begin{pmatrix} \frac{\partial^2 U}{\partial H^2} & \frac{\partial^2 U}{\partial H \partial V} \\ \frac{\partial^2 U}{\partial V \partial H} & \frac{\partial^2 U}{\partial V^2} \end{pmatrix}$$

Hence, the Hessian determinant is:

$$|A| = \begin{vmatrix} -(\varphi w^2 + \kappa + \delta\theta c_{11}(.)w^2) & -\kappa \\ -\kappa & -\kappa \end{vmatrix}$$

with the following principal minors:

$$|A_1| = -\left(\varphi w^2 + \kappa + \delta\theta c_{11}(.)w^2\right) < 0$$

$$|A_2| = \left(\varphi w^2 + \kappa + \delta\theta c_{11}(.)w^2\right)\kappa > 0,$$

where $c_{11}(.) = c_{11}(Y_n + wH, 1 - F)$.

Given that $|A_1| < 0$ and $|A_2| > 0$, A is negative definite and hence, satisfies the determinantal criteria for a maximum.

The equations for H^* and V^* can be solved simultaneously. Solving first for H^*:

$$H^* = \frac{(\beta - \varphi Y_n + \delta\theta c_1(.))w - \gamma + \kappa\left(T - \left(\frac{-\gamma+\kappa(T-H)+\xi\theta(1-F)}{\kappa}\right)\right)}{\varphi w^2 + \kappa},$$

$$\Rightarrow H^* = \frac{(\beta - \varphi Y_n + \delta\theta c_1(.))w + \kappa H - \xi\theta(1-F)}{\varphi w^2 + \kappa},$$

$$\Rightarrow \left(1 - \frac{\kappa}{\varphi w^2 + \kappa}\right) H^* = \frac{(\beta - \varphi Y_n + \delta\theta c_1(.))w - \xi\theta(1-F)}{\varphi w^2 + \kappa},$$

$$\Rightarrow H^* = \frac{(\beta - \varphi Y_n + \delta\theta c_1(.))w - \xi\theta(1-F)}{\varphi w^2}$$

Solving for V^*:

$$V^* = \frac{-\gamma + \kappa\left(T - \left(\frac{(\beta-\varphi Y_n+\delta\theta c_1(.))w-\xi\theta(1-F)}{\varphi w^2}\right)\right) + \xi\theta(1-F)}{\kappa}$$

$$\Rightarrow V^* = \frac{-\gamma + \kappa T - \frac{\kappa}{\varphi w}(\beta - \varphi Y_n + \delta\theta c_1(.)) + \left(\frac{\varphi w^2+\kappa}{\varphi w^2}\right)\xi\theta(1-F)}{\kappa}$$

The effect of F on H^* and V^* are therefore given by:

$$\frac{\partial H^*}{\partial F} = \left(\frac{\delta\theta c_{11}(.)w}{\varphi w^2}\right)\frac{\partial H^*}{\partial F} - \frac{c_{12}(.)w + \xi\theta}{\varphi w^2},$$

$$\Rightarrow \left(1 - \frac{\delta\theta c_{11}(.)w}{\varphi w^2}\right)\frac{\partial H^*}{\partial F} = -\frac{c_{12}(.)w + \xi\theta}{\varphi w^2},$$

$$\Rightarrow \frac{\partial H}{\partial F} = \frac{\xi\theta - c_{12}(.)w}{\varphi w^2 - \delta\theta c_{11}(.)w},$$

$$\frac{\partial V^*}{\partial F} = \frac{\delta\kappa\theta}{\kappa\varphi w}\left(c_{11}(.)\frac{\partial H^*}{\partial F}w - c_{12}(.)\right) - \left(\frac{\varphi w^2+\kappa}{\kappa\varphi w^2}\right)\xi\theta,$$

$$\Rightarrow \frac{\partial V^*}{\partial F} = \frac{\delta\theta}{\varphi w}\left(c_{11}(.)\left(\frac{\xi\theta - c_{12}(.)w}{\varphi w^2 - \delta\theta c_{11}(.)w}\right)w - c_{12}(.)\right) - \left(\frac{\varphi w^2+\kappa}{\kappa\varphi w^2}\right)\xi\theta,$$

$$\Rightarrow \frac{\partial V^*}{\partial F} = \frac{\delta\theta}{\varphi w}\left(\frac{c_{11}(.)(\xi\theta - c_{12}(.)w)w - c_{12}(.)(\varphi w^2 - \delta\theta c_{11}(.)w)}{\varphi w^2 - \delta\theta c_{11}(.)w} - \frac{(\varphi w^2+\kappa)\xi}{\delta\kappa w}\right),$$

where $c_{12}(.) = c_{12}(Y_n + wH, 1-F)$.

3.8 Appendix 3B

Table 3.B1: Hourly Wage: *First stage regression*

Hourly Wage		
Age	0.082***	(0.008)
Age Squared/100	-0.115***	(0.005))
Household size	-0.011***	(0.004)
Monthly non-labour Income	-0.0003***	(0.0001)
[a]Managerial Status: Supervisor	-0.036***	(0.012)
[a]Managerial Status: Non-Managerial	-0.093***	(0.012)
[b]Job Term: Temporary Contract	-0.105***	(0.024)
[b]Job Term: Fixed Term	-0.062***	(0.021)
[c]Union Recognition	0.092***	(0.010)
Regional unemployment Rate	0.003	(0.004)
Life expectancy at age 65	0.206***	(0.046)
Fairness of wealth distribution:		
[d]Strongly disagree	-0.017	(0.014)
[d]Disagree	0.002	(0.011)
[d]Neither Agree/Disagree	0.003	(0.011)
Prob > F		0.000
R^2		0.250
Number of observations [individuals]	12097 [5373]	

Notes: (1) ***, **, * denotes significance at the 1% level, 5% level, and the 10% level respectively. (2)Marital Status, and Health Status dummies are included. (3) Standard errors are in parenthesis. (4) Omitted categories: (a) Manager, (b) Permanent Job, (c) No Union Recognition (d) Agree.

Table 3.B2: Hourly Wage for different marital status: *First stage regression*

Weekly Hours	*Unmarried*		*Married*	
Age	0.113***	(0.015)	0.056***	(0.010)
Age Squared/100	-0.138***	(0.010)	-0.087***	(0.007)
Household size	-0.007	(0.007)	0.011*	(0.007)
Monthly non-labour Income	-0.0001	(0.0002)	-0.0004***	(0.0001)
[a]Managerial Status: Supervisor	-0.046*	(0.024)	-0.032**	(0.014)
[a]Managerial Status: Non-Managerial	-0.096***	(0.024)	-0.094***	(0.014)
[b]Job Term: Temporary Contract	-0.071**	(0.036)	-0.157***	(0.038)
[b]Job Term: Fixed Term	-0.018	(0.035)	-0.109***	(0.029)
[c]Union Recognition	0.083***	(0.020)	0.101***	(0.013)
Regional unemployment Rate	0.0004	(0.007)	0.004	(0.005)
Life expectancy at age 65	0.124	(0.089)	0.219***	(0.056)
Fairness of wealth distribution:				
[d]Strongly Disagree	-0.026	(0.027)	-0.015	(0.016)
[d]Disagree	-0.004	(0.021)	0.001	(0.013)
[d]Neither Agree/Disagree	0.006	(0.022)	-0.009	(0.014)
Prob > F		0.000		0.000
R^2		0.313		0.168
Number of observations [individuals]	4,834 [2,684]		7,263 [3,158]	

Notes: (1) ***, **, * denotes significance at the 1% level, 5% level, and the 10% level respectively. (2)Health Status, Occupation, and year dummies are included. (3) Standard errors are in parenthesis. (4) Omitted categories: (a) Manager, (b) Permanent Job, (c) Disagree.

Chapter 4

Perceived Fairness of the Wealth Distribution and Personal Savings: Evidence From Micro Data

4.1 Abstract

Economic behaviour is partly a product of the economic environment. Therefore, the wealth distribution that characterizes an economic environment can be expected to influence economic behaviour. Thus far, little has been done to identify the effects of distributional concerns on economic behaviour at the micro level. Using panel data, this paper investigates the relationship between fairness perceptions of the wealth distribution and individual savings. Couched in a basic theoretical framework, the empirical results from both an OLS model and a tobit model suggest that with the exception of non-white individuals, the amount saved out of monthly labour income increases as fairness perceptions of the wealth distribution become more favourable.

Key words: Fairness; Wealth distribution; Savings

JEL Classification: C23; D11; D12; D31; D63;

4.2 Introduction

Countries experiencing low savings run the risk of not being able to finance future consumption and generate sufficient investment for growth. Currently, many OECD countries face this predicament[1]. In the case of the United Kingdom (UK), data from the British Household Panel Survey (BHPS) indicate that each year, spanning 1991 to 2000, approximately 50 percent of employees saved nothing from their monthly income[2]. This is substantial. What is equally worrying is that the existing policies designed to tackle this problem may be deficient as they appear, by virtue of the persistently low savings, to have had little success in reversing current savings behaviour. To successfully undo this potentially ruinous trend of low savings, further research on the factors that influence savings decisions seems imperative.

A factor whose consideration may lend to a greater understanding of savings

[1]Most of the decline in the savings of OECD countries is due to a continued fall in personal savings (see the OECD Economic Outlook No. 74 and Serres and Pelgrin (2002) *inter alia* for evidence)

[2]In addition, data from the Office of National Statistics (available at http://www.statistics.gov.uk) also reveal that the UK household saving ratio fell significantly between 1991 and 2000.

behaviour and to the development of more effective policies, is the distribution of wealth. Such factors, which characterise the economic environment, are seldom the subject of in depth investigation though, intuitively, one would expect them to have some impact on individuals' willingness to save[3]. Moreover, unlike demographic factors, they can normally be directly influenced by policy makers.

Interestingly, the deterioration in savings has been occurring alongside increasing wealth inequality[4]. For instance, in the UK, concurrent with the low savings ratio, the percentage of wealth owned by the top 1 percent and 10 percent of the wealthiest individuals, increased from 17 percent and 47 percent in 1991 to 22 percent and 55 percent respectively in 2000[5]. Could it be that these phenomena are somehow related? There are both empirical evidence and theoretical arguments which suggest that they are (see for instance Lubell (1947), Duesenberry (1949), Metcalf (1972), Blinder (1975)). However, after the 1970s there seems to have been a cessation of studies on the relationship between the distribution of wealth and consumption and thereby savings. One reason for this appears to be the lack of

[3]See for instance, Katona (1975), Lunt and Livingstone (1991), van Veldhoven and Groenland (1993), and Lunt (1996).

[4]For example, see Förster and Pearson (2002) and Burniaux *et al* (1998) for evidence.

[5]Data are obtained from the Office of National Statistics, which are available at http://www.statistics.gov.uk.

appropriate data. The empirical studies relied almost exclusively on macro level data and were unable to arrive at any decisive conclusions. Apart from being important comparatively, a microeconomic analysis may provide greater insight into this relationship.

With that in mind, this paper seeks to shed some new light on the link between the distribution of wealth and consumption by contributing to the literature in two important ways. Firstly, micro level data, as apposed to macro data, is used and the panel nature of the data is exploited. In this respect, this study is the only one known at this time to conduct a robust microeconomic analysis of this issue. Secondly, rather than use a statistical measure of the distribution of wealth, which would be based on some assumed model, this study looks at *perceptions* of the fairness (equality) of the wealth distribution. This is believed to be a more pertinent variable insofar as it is individuals' perceptions that affect their motivations to save and these perceptions may not always be congruous with the verdict of the more objective measures of wealth inequality[6].

The paper is organised as follows. Section 2 reviews the related literature. This

[6]For arguments on the usefulness of subjective data in studying savings behaviour, see Alessie and Kapteyn (2001). See also van Praag (1977) and van Praag (1978) for an insight into the relationship between perceptions of wealth inequality and statistical measures of wealth inequality.

is followed in Section 3 by a synopsis of the underlying theoretical framework for the empirical analysis, which is presented in Section 4. Section 5 looks at some empirical issues that may have consequences for the robustness of the results and Section 6 concludes.

4.3 Related Literature

Extending the ideas forwarded by Fisher (1930) concerning the likely influence of psychological factors on the savings decisions of individuals, Keynes (1936) outlined eight broad motives that individuals may have for postponing consumption now in favour of consumption at a later date. These are precaution, foresight, intertemporal substitution, improvement, independence, enterprise, bequest, and avarice. They usefully form a near comprehensive list against which the determinants of savings could be examined[7].

Since then, most of the research analysing savings behaviour have focused on the precaution and foresight motives. These are embodied in the life cycle hypothesis proposed by Modigliani and Brumberg (1954) and the permanent income hypothesis developed by Friedman (1957). In the economics literature, these are

[7]An additional motive, the downpayment motive, has since then been added to this list (see Browning and Lusardi (1996)).

by far the dominant paradigms of savings. The life cycle hypothesis emphasises savings for retirement while the permanent income hypothesis stresses savings to buffer pre-retirement income shocks. Correspondingly, they both propose that individuals are forward looking, be it over the lifetime (the life cycle model) or an infinite number of periods (the permanent income hypothesis). Since their formation, many variations of these models have been proposed, a survey of which can be found in the widely acknowledged work of Browning and Lusardi (1996) (see also Attanasio and Banks (2001)).

However, while they explain a significant portion of savings behaviour, what is generally true of models in the life cycle hypothesis and permanent income hypothesis genre is that they do not normally have much to say about the factors that shape individuals' motivation to save or indeed explain how motivations to save might be affected. This is mainly because they assume that motivational factors are characteristic traits that remain more or less unchanged. Therefore, they may be handicapped in informing effective policy measures to stimulate savings. For instance, according to these models the entrenched phenomenon of low and inadequate savings should not exist. Yet, there is plenty of evidence that indicates that individuals are not smoothing consumption sufficiently and that a persistent and sizeable amount undersave[8]. To explain this phenomena, Rabin (2002) sug-

[8]For evidence, see the OECD Economic Outlook No.74 and Serres and Pelgrin (2002) *inter*

gests that economists should incorporate the psychology of saving in their analyses of savings behaviour. Certainly, it seems sensible to consider the possibility that motives such as uncertainty and precaution may react to changes in the economic environment[9]. In what may be considered an appeal to economists to consider the benefits of psychological realism in understanding economic behaviour, he argues that psychologically inspired models are able to yield both the standard predictions based on the concept of pure rationality as well as explain some of the anomalies that remain a puzzle to economists.

The importance of integrating factors that affect motivation into economic analyses of savings behaviour is elaborated in the influential work of Katona (1975). The subsequent and persuasive studies by van Veldhoven and Groenland (1993), Wärneryd (1989) and Lunt (1996) *inter alia*, served to further the arguments that factors such as those which characterise the macro economic environment may meaningfully influence psychological variables like optimism, (in)security, and

alia for evidence. See also Thaler (1994) for further criticisms of the Life Cycle hypothesis which can also be applied to the permanent income hypothesis

[9]An interesting theoretical study by Robson (1992) proposes that utility depends on the distribution of wealth both directly and indirectly through status and that status, which may change with the distribution of wealth, have implications for risk taking behaviour.

status seeking. In turn these are likely to affect individuals' motivation to save[10]. For that reason, Katona (1975) draws attention to the need to consider not only individuals' ability to save but also their willingness. While disposable income measures an individual's ability to save, it is these intervening psychological factors, which react to changes in the economic environment, that reflect the willingness to save.

Unfortunately, many economists are still reluctant to employ subjective data in the econometric analysis of individual behaviour[11]. Admittedly, given the nature of these intervening variables, obtaining reasonable measures can be difficult. These two elements are perhaps partially responsible for the lacuna in the literature with respect to analyses incorporating the psychology of saving. However, it is possible to account for these psychological variables by looking at the factors that influence them, such as, for instance, factors which capture the state of the economy. Indeed, there are some studies that have looked at how the distribution of wealth might affect savings behaviour.

[10]For example, if the state of the economy gives rise to greater optimism then individuals may see less of a need to be precautious and may become more avaricious. As a result, savings might fall.

[11]See Rabin (2002) for a discussion on this issue.

Notable enquiry into the economic consequences of the distribution of income and wealth began during the late Depression era. The Brookings study by Moulton (1935) proposed that greater income inequality lead to higher aggregate savings. This was based on the argument that individuals in higher income brackets tend to save a larger fraction of their income than those in lower income brackets. Therefore, redistributing income from richer to poorer individuals would reduce savings and increase consumption. However, Moulton (1935), like other studies at the time, did not offer a psychological motivation for this observed behaviour. Moreover, this proposition was not rigorously tested.

In a related study, Lubell (1947) examined the effect of a redistribution of income on savings. Using household level data and keeping the aggregate income of the sample unchanged, he found slight evidence of a negative relationship between savings and the redistribution of income. This supported the hypothesis of Moulton (1935). However, though he regarded the data as being the best available at the time, he declared that it might be "thoroughly inadequate"[12]. The redistribution of income was achieved in a rather ad hoc manner: the average income was adjusted by a given percentage of the difference between it and the mean of the entire distribution. Moreover, the data was not subjected to a robust regression analysis. The empirical technique simply involved the division of total family

[12]The sample was also relatively small with less than 2000 observations.

income into consumption and savings for each generated redistribution and the subsequent comparison of the aggregated consumption and savings. In addition, it was suggested in the study that there may be large reporting errors vis-à-vis income. Therefore, the results may have been adversely affected by the quality of the data.

With the literature still no decisively clearer as to the nature of the relationship between savings and the distribution of income and wealth, Duesenberry (1949) presented a different perspective by arguing that a more equal distribution of income could actually lead to a rise in savings. This conclusion was based on his relative income hypothesis under which it is assumed that utility depends not only on own income but also on own income relative to a weighted average of the income of others. Consequently, individuals will seek to do as well as or better than those in higher income brackets[13], which is manifested in higher (conspicuous) consumption.

Similarly, the theoretical arguments of Corneo and Jeanne (1999) suggest that greater equality may lead to higher savings. The intuition however, is different to

[13]That is, individuals will engage in status seeking, popularly known as 'keeping up with the Joneses'. Also, this type of behaviour correlates with the argument that individuals have present-biased preferences (Rabin (2002))

that offered by Duesenberry (1949). They proposed that a more segmented society gives rise to groups of individuals who closely resemble each other in terms of characteristics and accordingly, there will be lower inequality among the individuals who compete against each other for status. As a result, it will pay individuals to accumulate wealth so that they can be better off than their rivals in the future.

This theorised positive relationship between savings and the equality of the distribution of income and wealth is supported by empirical evidence in Metcalf (1972) and Blinder (1975). Using aggregate time series analysis and including a measure of the size distribution of income in the consumption equation, they both found that, though in some instances the distribution of income had no significant influence on savings, there were reasonable indications that an increase in income inequality leads to a fall in savings. However, the results from both studies are at best suggestive, a fact acknowledged by the authors. The main limitation to more conclusive results can be attributed to data inadequacy[14].

[14]The study by Della Valle and Oguchi (1976) analyses the relationship between aggregate consumption and the distribution of income using cross-country data. The sample consisted of 37 developed and less developed countries. They regressed the average propensity to consume on the Gini coefficients and found that, consistent with the findings of Metcalf (1972) and Blinder (1975), a rise in income inequality leads to a rise in aggregate consumption and a fall in aggregate savings. However, when the sample consisting only of OECD countries was considered, the reverse result was discovered. Again, the reliability of the data is questionable.

From the existing literature, it is clear that to arrive at a more robust answer to the question of whether and how the distribution of income and wealth enters the consumption and savings function better data is required. Further, since the distribution of income and wealth is expected to affect individuals' motivations what seems needed is a measure of their perceptions of the distribution of income and wealth. This study makes these additions to the literature.

4.4 Theoretical Framework

The empirical focus is on how an individual's perception of the fairness of the wealth distribution influences the amount that is saved each month out of monthly income. As a theoretical guide to the empirical analysis, consider the following stylised model in which the individual derives utility from consumption subject to the constraint that income is exhausted on consumption and savings[15].That is:

$$\underset{\{c_t\}}{Max}\ U = U(c_t) \tag{4.1}$$

given the budget constraint:

$$c_t + s_t = y_t + \omega_t, \tag{4.2}$$

[15]It is important to note that a more complicated model would not have any serious implication for the analysis and would not have added to the basic intuition.

and:

$$c_t \leq y_t + \omega_t \text{ and } s_t \geq 0; \quad c_t > y_t + \omega_t \text{ and } s_t < 0, \tag{4.3}$$

where c_t is desired consumption at time t, s_t is desired savings at time t, y_t is exogenous (disposable) labour income at time t, and ω_t is exogenous non-labour wealth at time t. Utility, U, is assumed to be concave and strictly increasing in c_t.

Assuming that the constraints of equation (4.2) are satisfied and that the first order condition for the utility maximising level of consumption is a function of income, wealth and individual characteristics, the optimal solution to the utility maximisation problem of equation (4.1) can be represented generally as:

$$c_t = c(y_t, \omega_t, \mathbf{X}_t) \tag{4.4}$$

$$c'_{t,y_t}(.) \geq 0, \quad c'_{t,\omega_t}(.) \geq 0,$$

where $\mathbf{X}_t$ is a vector of individual characteristics that influence consumption at time t.

From equation (2), the corresponding optimal savings solution can be written as:

$$s_t = y_t + \omega_t - c(y_t, \omega_t, \mathbf{X}_t) \tag{4.5}$$

$$s'_{t,y_t}(.) \geq 0, \quad s'_{t,\omega_t}(.) \geq 0$$

Factors representing distributional concerns or concerns about the economic

environment are not ordinarily included in the vector $\mathbf{X}_t$. However, it has been demonstrated by many in the economics and the economic psychology literature that perceptions of the economic environment can influence individuals' behaviour (see Rabin (2002) for a discussion) not least of all their motivation to save. Katona (1975) proposed that individuals' behaviour respond to changes in economic conditions and hence, an individual's motivation to save can be influenced by his optimism or pessimism of the state of the economy. This reasoning is supported by the findings of Lunt and Livingstone (1991). Based on a 1990 study of over 200 residents in Oxford, they found that individuals who save tend to have a better outlook on the state of the economy. Further arguments stressing the role of the economic environment in determining savings behaviour are presented in the studies by van Veldhoven and Groenland (1993), and Lunt (1996), *inter alia*.

In addition, other studies propose that utility depends on the distribution of wealth. In studying attitudes to risk, Robson (1992) develops a model in which utility depends indirectly, via status, on the distribution of wealth. Metcalf (1972) and Blinder (1975) also suggest that utility is a function of the wealth distribution. More specifically, the study by Corneo and Jeanne (1999) implies that the distribution of wealth may have behavioural consequences for savings. They argued that when wealth inequality among those who are status competitors is low, individuals will be motivated to save in the hope of advancing their economic position

in the future by being able to afford higher future consumption. In short, there are reasons to assume that the fairness of the wealth distribution enters the utility function and affects savings behaviour.

Nonetheless, it is not possible to say definitively *a priori* what the likely effect of the fairness of the wealth distribution would be on individuals' motivation to spend and hence, to save. Certainly, there are plausible reasons why the effect on consumption may be either positive or negative. For example, an unequal wealth distribution may increase uncertainty or pessimism about the future[16] and hence individuals, being risk averse, will take precaution by consuming less and saving more in order to ensure that they are able to meet and maintain consumption in the future should they fare less well[17]. Also, an unfair wealth distribution may create social tensions and harm may be targeted towards those thought to be advantaged by the status quo (see Kelly (2000)). To protect themselves, these individuals who are advantaged may reduce consumption so as not to attract attention to themselves.

[16]See van Veldhoven and Groenland (1993)and Lunt (1996) for similar arguments.

[17]See for instance Miles (1997) for related evidence on the impact of earnings uncertainty on savings.

On the other hand, by affecting status[18], an unequal wealth distribution may encourage the behaviour of 'keeping up with the Joneses' and 'keeping ahead of the Smiths'. Individuals may spend more and save less in a bid to reduce the gap between themselves and those who are better off and to better their economic position as well as to maintain their relatively better economic standing vis-à-vis those who are less well off. This is consistent with the argument that a more equal wealth distribution reduces status competition today and encourages savings for future status competition (see Corneo and Jeanne (1999)).

Therefore, considering that the individual cares about distributional fairness and that an unfair wealth distribution in some way affects his consumption decision, the simple model can be extended to explicitly account for the role of fairness of the wealth distribution in determining consumption and savings. Optimal consumption may thus be expressed as:

$$c_t = c(y_t, \omega_t, \gamma F_t, \mathbf{X}_t), \tag{4.6}$$

$$c'_{t,y_t}(.) > 0, \quad c'_{t,\omega_t}(.) > 0,$$

where F denotes the extent to which wealth is fairly distributed[19] and γ represents

[18]For reasons why the fairness of the wealth distribution could affect status see Robson (1992) and Harbaugh (1996).

[19]Correspondingly, $(1 - F)$ denotes the extent of the unfairness of the wealth distribution.

the extent to which the individual cares about fairness. Again, given the budget constraint of equation (4.2), the model of savings can be specified as:

$$s_t = y_t + \omega_t - c(y_t, \omega_t, \gamma F_t, \mathbf{X}_t) \tag{4.7}$$

If $\gamma = 0$, the simple model in equation (4.1) to (4.5) obtains and the fairness of the wealth distribution has no effect on the individual's consumption or savings behaviour. If $\gamma > 0$, the effect of the fairness of the wealth distribution on the consumption and savings of the individual could be either positive or negative. The empirical analysis seeks to establish which.

4.5 Empirical Analysis

This section evaluates the relationship between savings and perceptions of the fairness of the wealth distribution by determining whether there are significant differences in the savings behaviour of individuals with different fairness perceptions of the wealth distribution.

4.5.1 The data

The analysis uses waves 1, 3, 5, 7, and 10 of the British Household Panel Survey (BHPS) data set. The BHPS is a national representative household-based survey

of approximately 5,500 households, which are drawn from 250 areas of the United Kingdom. The survey provides detailed information on individual and household characteristics on an annual basis. The first wave interviews were carried out during the autumn of 1991 (see Taylor (1996) for more information on the BHPS).

In this study, data are used only for individuals who are of working age at the time of the interviews[20] and are in employment. The main reason for this is to focus the analysis on individuals who typically have the resources to save every month. However, since reliable income data are not available for self-employed individuals, they are not included in the analysis[21]. In addition, only observations with valid information are used and to avoid biased and distorted estimates, individuals with monthly savings greater than the UK mean gross monthly income of approximately £1,200 are classed as outliers and are excluded from the analysis[22]. The resulting

[20]That is, age 16 to 64 for men and 16 to 59 for women.

[21]For instance, for the BHPS waves used here, income data is imputed for over 41 percent of self-employed individuals compared to only 17 percent for employees. In addition, it is not possible to differentiate the personal savings of self-employed individuals from the savings of their firm.

[22]Regression coefficients that minimise the sum of squared errors are sensitive to outliers. Indeed, statistical tests based on sample means and variances may be severely distorted by the presence of outliers. To note, before their exclusion, the sample contained 22,433 observations.

sample contains 22,400 person-year observations. Sample statistics are presented in Table 4.1.

The dependent variable is individual monthly savings and is defined as the amount out of monthly income saved. It is derived from individuals' response to two questions concerning their savings behaviour. Individuals are asked "*Do you save any amount of your income for example by putting something away now and then in a bank, building society, or Post Office account other than to meet regular bills?*". If they respond 'yes', they are then asked "*About how much on average do you manage to save a month?*" Individuals who responded 'no' are assigned a value of zero. Those who answered 'yes' are assigned the monthly savings value stated in response to the second question. At this juncture, it should be pointed out that the nature of these questions is such that only information on positive savings is solicited. Dissavings is not considered and hence the savings variable will be characterised by corner solutions.

The data indicate that close to half of the employees in England do not save anything from their income and over two-thirds save less than the average: of the entire sample, 69.98 percent of individuals save less than the average of £67.36

Thus, the outliers counted for 0.15 percent of the sample.

and 48.92 percent save nothing at all from income[23]. A similar breakdown of the savings behaviour of individuals by demographic characteristics and fairness perceptions of the wealth distribution is given in Table 4.2 and information on why individuals save can be found in Table 4.3[24].

The explanatory variable of interest is fairness perception of the wealth distribution. The question which provides the information on individuals opinion on how fairly wealth is distributed is as follows:

> "*...which answer... comes closest to how you feel about the following statement? Ordinary people get their fair share of the nation's wealth:*"
>
> 1. *Strongly disagree*
> 2. *Disagree*
> 3. *Neither agree/disagree*
> 4. *Agree*
> 5. *Strongly agree*

The percentage of those stating that they strongly agree is quite low at 0.54

[23]This means that 21.06 percent save more than zero but less than the average.

[24]It can be presumed that the impact of fairness perceptions on savings would fall under the 'no specific reason' why individuals save.

percent. Hence, categories 4 and 5 are grouped together as the single category 'Agree'. With that, 13.18 percent of individuals agree that wealth is fairly distributed, 20.84 percent neither agree nor disagree, 51.85 percent disagree, and 14.13 percent of individuals strongly disagree[25]. It can be seen from Table 4.4 that there is some variation across waves in fairness perceptions of the wealth distribution. This is important in order to carry out meaningful analysis of the influence of fairness perceptions of the wealth distribution on savings.

[25]In 1991, the order of the fairness perception response choices presented to respondents on the showcard was slightly different to that of the other years. In 1991, the choices were ordered as follows: Strongly Agree, Agree, Neither Agree nor Disagree, *Disagree*, Strongly Disagree. In the other years, they were in the following order: Strongly Agree, Agree, Neither Agree nor Disagree, Strongly Disagree, *Disagree*. Given that the last two categories are combined, this variation in ordering is not expected to have any appreciable effect on the empirical findings. Another slight difference in the information preceding the eventual question should be noted. The question was read out as follows in 1991: "*Which answer off the card (V1) comes closest to how you feel about the following statement? Ordinary people get their fair share of the nation's wealth*" and in the other years, it was read out as: "*People have different views about society. I'm going to read out some things people have said about Britain today and I'd like you to tell me which answer off the card (30) comes closest to how you feel about each statement. Ordinary people get their fair share of the nation's wealth*". It is held here that the added information read out to respondents in the years 1993, 1995, 1997, and 2000 is not of an influential nature and since there is no difference in the actual question, the findings are unlikely to be significantly compromised.

Table 4.5 and Table 4.6 summarise savings and the average propensity to save[26] respectively by fairness perceptions of the wealth distribution. *Prima facie*, it can be concluded from the tables that for all individuals, there is a positive relationship between monthly savings and the perceived fairness of the wealth distribution. As is evident, savings and the average propensity to save are higher the more favourable the fairness perception of the wealth distribution. For example, individuals who agree that wealth is fairly distributed have on average the highest savings as well as the highest average propensity to save whilst those who strongly disagree have on average the lowest. Moreover, the difference in savings between successive perceptions of the fairness of the wealth distribution is statistically significant. Furthermore, except for the difference between individuals who neither agree nor disagree that wealth is fairly distributed and those who agree that it is, the same is true for the difference in the average propensity to save between different perceptions of the fairness of the wealth distribution.

To get a rough idea of how consistent this relationship is for various demographic characteristics, further tabulations are carried out and these are also presented in Tables 4.5 and 4.6. From these tabulations, it appears that the positive relationship between monthly savings and fairness perceptions of the wealth distribution holds for both male and female individuals. However, for male individuals

[26]This is simply monthly savings divided by current monthly income.

this relationship seems comparatively stronger. Indeed, for the male subsample, the difference in savings between successive perceptions of the wealth distribution is statistically significant. The same is true for the difference in the average propensity to save.

In contrast, for the female subsample, it emerges that there is no significant difference between the savings of individuals who neither agree nor disagree that wealth is fairly distributed and that of those who agree that it is. This is also found to be the case for the difference in the average propensity to save of these two groups of female individuals. In addition, the average propensity to save of female individuals who strongly disagree that wealth is fairly distributed is not significantly different from that of those who agree that it is fairly distributed.

For the sample of white individuals, Table 4.5 reveals that there is a positive correlation between savings and fairness perceptions of the wealth distribution. This relationship appears to be strong given that the difference in the mean savings of individuals with different fairness perceptions of the wealth distribution is statistically significant. Table 4.6 further illustrates that controlling for income the positive relationship remains. The average propensity to save increases as fairness perceptions of the wealth distribution becomes more favourable and apart from the difference between those who neither agree nor disagree and those who agree that wealth is fairly distributed, there is a significant difference between the average

propensities to save of white individuals who have different fairness perceptions of the wealth distribution.

Interestingly, the figures in Table 4.5 suggest that for non-white individuals[27], savings may be negatively correlated with fairness perceptions of the wealth distribution. On the other hand, the figures in Table 4.6 indicate that when income is taken into consideration, the relationship between savings and fairness perceptions of the wealth distribution appears to be slightly positive. Indeed, the average propensity to save increases as fairness perceptions of the wealth distribution become more favourable. However, it turns out that the difference in savings of non-white individuals with different fairness perceptions of the wealth distribution is not statistically significant. With the exception of the difference between those who disagree and those who agree that wealth is fairly distributed, there is no difference in the average propensities to save of non-white individuals with different perceptions of the wealth distribution.

For each age cohort, the figures in Table 4.5 and Table 4.6 suggest that there is a possible positive relationship between savings and fairness perceptions of the wealth distribution. Both savings and the average propensity to save generally tend to increase as fairness perceptions of the wealth distribution becomes more

[27]Non-whites include all individuals who class their ethnic origin as other than white.

favourable and in most cases, the means are statistically different from each other. However, comparing cohorts, no pattern in the differences in mean savings and the average propensity to save can be discerned. This implies that the difference in the savings behaviour of individuals with different perceptions of how fairly wealth is distributed is not influenced by age.

The tabulations further reveal that the positive relationship between savings and fairness perceptions of the wealth distribution exists regardless of the income quartile of individuals. It can be seen that monthly savings and the average propensity to save increase as fairness perceptions of the wealth distribution becomes more favourable. On the contrary, the relationship across income quartile is less obvious. Indeed, a significantly strong pattern cannot be detected. Therefore, it would seem that the difference in savings and the average propensity to save between individuals with different perceptions of how fairly wealth is distributed is not affected by income quartile.

In sum, the crude analysis of the data leads to the preliminary conclusion that, with the possible exception of non-white individuals, there is a positive relationship between an individual's monthly savings and his perceptions of how fairly wealth is distributed. To determine whether this relationship is robust when other factors are controlled for, the data is explored more rigorously by regression analysis in the following section.

4.5.2 Specification Issues and Estimation Procedure

Referring to equation (4.7), the statistical savings model to be estimated for individual i at time t is derived by linearising the dependence of consumption on its determinants. Adding a time specific effect, ρ_t and an individual specific time-invariant effect, α_i, gives:

$$s_{it} = \rho_i + y_{it}\beta_1 + \omega_{it}\beta_2 + F_{it}\beta_3 - \mathbf{X}_{it}\beta_4 + \alpha_i + u_{it}$$

which is more succinctly written as:

$$s_{it} = \mathbf{Z}_{it}\Gamma + \alpha_i + u_{it} \tag{4.8}$$

$$i = 1, ..., N; t = 1, ..., T;$$

The idiosyncratic error term, denoted by u_{it}, is independently identically distributed $(i.i.d)$ with mean zero and variance σ_u^2. Γ represents a vector of parameters to be estimated. It is further assumed that $E(u_{it}|\mathbf{Z}_{it}, \alpha_i) = 0$ where $\mathbf{Z}_{it} \equiv (\rho_t, y_{it}, \omega_{it}, F_{it}, \mathbf{X}_{it})$[28]. The variables included in $\mathbf{X}$ are guided by economic theory and data availability. These are age and its square, other monthly household income, marital status, health status, responsible for children 16 years and under, home ownership, household size, expected financial status, and employer pension provision.

[28]This means that, conditional on α_i, the observable explanatory variables are considered to be strictly exogenous.

Additionally, to have a coherent econometric model, there are two important features of the data that must be taken into account: (1) Corner solutions: zero is a natural choice and there is a positive probability mass at zero[29] and (2) Non-linearity: non-negative predictions are excluded. Furthermore, $\mathbf{Z}_{it}$ has a reasonably wide range[30].

In light of these features of the data, estimation of equation (4.8) by ordinary least squares (OLS) though probably informative, would be inappropriate. For example, suppose that the entire sample, inclusive of the corner solutions, is used. Then:

$$\begin{aligned} E(s_{it}) &= P[s_{it} > 0].E(s_{it}|s_{it} > 0) + 0 \\ &= P[s_{it} > 0].\{\mathbf{Z}_{it}\Gamma + \alpha_i + E(u_{it}|u_{it} > -(\mathbf{Z}_{it}\Gamma + \alpha_i))\} \\ &\neq \mathbf{Z}_{it}\Gamma + \alpha_i, \end{aligned}$$

which means that the OLS estimates, in this instance, would be biased.

If in an attempt to avoid the problem of dealing with the corner solutions only

[29]A high proportion, 48.92 percent, of individuals have savings of zero.

[30]Wooldridge (2002) points out that unless the range of $\mathbf{Z}_{it}$ is limited, $E(y|\mathbf{Z}_{it})$ cannot be linear.

the sample of interior solutions is used, then:

$$\begin{aligned} E(s_{it}|s_{it} > 0) &= E(s_{it}|s^*_{it} > 0), \\ &= E(s^*_{it}|s^*_{it} > 0) \\ &= \mathbf{Z}_{it}\Gamma + \alpha_i + E(u_{it}|\mathbf{Z}_{it}\Gamma + \alpha_i + u_{it} > 0) \\ &= \mathbf{Z}_{it}\Gamma + \alpha_i + E(u_{it}|u_{it} > -(\mathbf{Z}_{it}\Gamma + \alpha_i)) \\ &\neq \mathbf{Z}_{it}\Gamma + \alpha_i \end{aligned}$$

where s^*_{it} is the latent or 'uncensored' dependent variable[31]. In other words, it is the true level of savings. As can be deduced, the OLS estimator would also be biased in this case.

A model that overcomes this biasness by accounting for the fact that the dependent variable has a cluster of observations at zero but is partly continuous for others, is the tobit model[32] formulated by Tobin (1958). Accordingly, a fuller

[31]Note that the term uncensored is placed in quotes because strictly speaking, data observability is not a problem here but rather the dependent variable is characterised by a concentration of observations at zero. However, this term is used as it has become common place in the literature when describing such data.

[32]A related characteristic of the tobit model is that it takes into account that there is both a quantitative and a qualitative difference between the corner solutions and the interior solutions.

observational structure for equation (4.8) can be written as:

$$\begin{aligned} s_{it}^{*} &= \mathbf{Z}_{it}\Gamma + \alpha_i + u_{it} \\ s_{it} &= \max(0, s_{it}^{*}) \quad i = 1, ..., N; t = 1, ..., T; \end{aligned} \tag{4.9}$$

Notwithstanding the general biasness of the OLS estimates, it is consistently found in the empirical literature that the tobit estimates are approximately equal to the OLS estimates for the entire sample divided by the proportion of observations for which there is an interior solution (see Greene (2000)). When this is the case, a certain degree of confidence can be had in the validity of the tobit specification and in general, the qualitative implications of the findings. Thus, for comparative purposes both OLS and Tobit estimates are reported. Before doing so, the following specification issues are addressed.

4.5.2.1 *Modelling unobserved heterogeneity*

The approach used to obtain reliable parameter estimates depends on the assumed relationship between unobserved heterogeneity, α_i, and the observable explanatory variables, $\mathbf{Z}_{it}$. Typically, two approaches are considered; a random effects approach and a fixed effects approach. In both cases, α_i is treated as random (see Mundlak (1978)).

If it is that α_i is orthogonal to the observed explanatory variables, that is,

$E(\alpha_i|\mathbf{Z}_{it}) = E(\alpha_i) = 0$, a random effects method of estimation in which α_i forms part of the composite error term, would yield both consistent and efficient estimates. In this case, the estimates from a fixed effects method would be consistent but inefficient. If however, α_i is arbitrarily correlated with the observed explanatory variables, a fixed effects estimation method, would, versus a random effects method, give consistent and efficient estimates. On the other hand, the estimates from a random effects method would be inefficient.

The OLS Model:

For the OLS model, a Hausman (H) test was used to judge the validity of a random effects approach. This test is based on the reasoning that under the null hypothesis that $E(\alpha_i|\mathbf{Z}_{it}) = 0$, both methods should yield consistent estimates and hence the generalised least squares (GLS) estimates from the random effects approach and the within group estimates from the fixed effects approach should not differ systematically. If there are systematic differences between the estimates, the null hypothesis is rejected and the random effects approach is not appropriate. The H statistic for this test is given by

$$H = \left[\hat{\delta}_{FE} - \hat{\delta}_{RE}\right]' \left[\hat{cov}(\hat{\delta}_{FE}) - \hat{cov}(\hat{\delta}_{RE})\right]^{-1} \left[\hat{\delta}_{FE} - \hat{\delta}_{RE}\right]$$

and is distributed χ^2 with m degrees of freedom, where δ_{FE} is a 1 x m vector of within-group estimates on the time-varying observables, δ_{RE} is a 1 x m vec-

tor of GLS estimates on the time-varying observables and $\hat{cov}(\hat{\delta}_{FE})$ and $\hat{cov}(\hat{\delta}_{RE})$ are consistent estimates of the asymptotic covariance matrices of δ_{FE} and δ_{RE} respectively.

The implementation of this test leads here to a rejection of the random effects model. This means that individual specific effects have some influence on the explanatory variables and should be controlled for. For instance, individuals with a distrustful or melancholic disposition may be more inclined to believe that the wealth distribution is unfair. Hence, for the OLS model, a fixed effects method of estimation is employed.

To facilitate the fixed effects estimation in the OLS model, the α_is are treated as parameters to be estimated and equation (4.8) is transformed by first averaging all variables over time to get rid of the individual heterogeneity effect, α_i. This gives the following cross section equation:

$$\bar{S}_i = \bar{\mathbf{Z}}_i\Gamma + \alpha_i + \bar{u}_i \qquad (4.10)$$

$$i = 1, ..., N;\ t = 1, ..., T;$$

where only the time-varying variables are contained in $\mathbf{Z}_i$[33].

[33]The coefficients in Γ corresponding to the time invariant explanatory variables are set to zero.

Equation (4.10) is then subtracted from equation (4.8) to get the fixed effects estimation equation:

$$S_{it} - \bar{S}_i = [\mathbf{Z}_{it} - \bar{\mathbf{Z}}_i]\Gamma + [u_i - \bar{u}_i] \tag{4.11}$$

$$i = 1, ..., N;\ t = 1, ..., T,$$

which is estimated by OLS.

The Tobit Model:

For a non-linear model, such as the tobit model, it is not possible to control for fixed effects by differencing. Instead, a fixed effects approach developed by Chamberlain (1984), which is often referred to as the correlated random effects approach, is compared to the standard random effects model to determine the appropriateness of the latter.

The standard tobit random effects model is simply equation (4.9) in which case α_i is assumed to be orthogonal to $\bar{\mathbf{Z}}_i$. To construct the tobit correlated random effects model, the standard random effects model is modified by allowing α_i and $\mathbf{Z}_{it}$ to be arbitrarily correlated. Next, α_i is explicitly modelled as a linear function of the average of the explanatory variables over time.

$$\alpha_i = \varrho + \bar{\mathbf{Z}}_i\Phi + \zeta_i \tag{4.12}$$

where ζ_i is a random individual specific effect, which is $i.i.d$ with mean zero and variance σ_ζ^2 and $\bar{\mathbf{Z}}_i$ is a vector of the average of the time-varying explanatory variable for individual i over time[34]. Note that the time effects are excluded from $\bar{\mathbf{Z}}_i$ since they are already present in $\mathbf{Z}_{it}$.

The model to be estimated is then simply equation (4.9) with $\bar{\mathbf{Z}}_{it}$ as an additional regressor:

$$\begin{aligned} s_{it}^* &= \mathbf{Z}_{it}\Gamma + \bar{\mathbf{Z}}_i\Phi + \zeta_i + u_{it} \\ s_{it} &= \max(0, s_{it}^*) \qquad i = 1, ..., N; t = 1, ..., T; \end{aligned} \tag{4.13}$$

where the constant ϱ is now part of the intercept term in Γ.

A likelihood ratio (LR) test is used to determine which of the two approaches is appropriate. This is basically a test of $\Phi = 0$. Hence, in this case, the standard random effects model is the restricted model and the correlated random effects model is the unrestricted model. If the LR value exceeds the critical value, the null hypothesis that $\Phi = 0$ is rejected and the standard random effects model is not appropriate. The LR test statistics is given by:

$$\text{LR} = 2[L(\hat{\theta}) - L(\tilde{\theta})],$$

which is distributed χ_J^2, where J is the number of restrictions under the null. The

[34]The coefficients in Φ corresponding to the time-invariant variables are set to zero.

terms $L(\tilde{\theta})$ and $L(\bar{\theta})$ represent the maximised values of the log-likelihood functions associated respectively with the unrestricted model and the restricted model[35].

The result from this test is $\chi^2_{13} = 170.74$, which leads to a rejection of the null hypothesis. Thus, not surprisingly, as in the case of the OLS model, the result of the test implies that it is necessary to control for individual specific fixed effects in the tobit model. The correlated random effects estimation approach is therefore employed.

4.5.2.2 *Is Fairness Perception of the Wealth Distribution Exogenous?*

Hitherto, it has been assumed that fairness perceptions of the wealth distribution, F, is uncorrelated with the error term, u_{it}. However, there are two main reasons why this assumption may not be valid. First, an individual's perception of the wealth distribution may be affected by the amount he saves on a monthly basis. For instance, individuals who save comparatively more a month may tend to have more favourable fairness perceptions of the wealth distribution. Secondly, possible measurement error may cause a spurious correlation between F_{it} and u_{it}.

Given that fairness perceptions of the wealth distribution is the variable of

[35]So, $\tilde{\theta}$ is the unrestricted estimator which corresponds to the correlated random effects model and $\bar{\theta}$ is the restricted estimator which corresponds to the standard random effects model.

interest, it is of paramount importance to substantiate the assumption that it is exogenous in the savings equation. If it is not, the estimates are likely to be biased and the consistency of the other estimates may be compromised. To this end, a regression-based test for the endogeneity of fairness perceptions of the wealth distribution in the savings equation is conducted. This test was proposed by Hausman (1978, 1983) to deal with the linear model and further extended by Smith and Blundell (1986) to deal with the tobit model. The test is done by first regressing F_{it} on $\rho_t, y_{it}, w_{it}, \mathbf{X}_{it}, \alpha_i$, and a valid set of instruments G. The residuals, v_{it}, are then obtained and included as an additional regressor in the OLS model of equation (4.11) and the tobit model of equation (4.13) to give the following respective equations:

OLS model:

$$S_{it} - \bar{S}_i = [\mathbf{Z}_{it} - \bar{\mathbf{Z}}_i]\Gamma + [v_{it} - \bar{v}_i]\pi + [u_i - \bar{u}_i] \qquad (4.14)$$

$$i = 1, ..., N; \; t = 1, ..., T,$$

Tobit model:

$$\begin{aligned} s^*_{it} &= \mathbf{Z}_{it}\Gamma + \bar{\mathbf{Z}}_i\Phi + v_{it}\pi + \bar{v}_i\eta + \zeta_i + u_{it} \\ s_{it} &= \max(0, s^*_{it}) \quad i = 1, ..., N; t = 1, ..., T; \end{aligned} \qquad (4.15)$$

Equation (4.14) is estimated by an OLS fixed effects method and equation (15)

by the tobit correlated random effects method. In both cases, the coefficient (π) on v_{it} is tested for significance. If $\pi = 0$, it can be concluded that F_{it} is not endogenous.

The variable employed as an instrument for F is one representing individuals' opinion on whether 'there is one law for the rich and one for the poor'. It is held that an individual's beliefs as to whether rich and poor individuals are treated differently will influence his perception of how fairly wealth is distributed but will not directly affect his monthly savings.

The validity of this instrument is checked using tests recommended by Bound *et al* (1995) and Staiger and Stock (1997). A first requirement is that fairness perceptions of the wealth distribution should be strongly correlated with perceptions of whether 'there is one law for the rich and one for the poor'. The partial correlation (R^2) between fairness perceptions of the wealth distribution and opinions on whether 'there is one law for the rich and one for the poor' is 0.160. Compared to that reported in the literature, this degree of correlation is reasonable. More importantly, the F-statistic for the coefficient on this instrument in the fairness perceptions of the wealth distribution equation is 143.67. This greatly exceeds the benchmark value of 10 proposed by Staiger and Stock (1997) and suggests that the instrument does enter the first stage regression. Secondly, it is necessary that beyond its impact through fairness perceptions of the wealth distribution, opinions

on whether 'there is one law for the rich and one for the poor' should be uncorrelated with savings. The partial correlation (R^2) between monthly savings and opinions on whether 'there is one law for the rich and one for the poor' is 0.006. In addition, the effect of this instrument in the savings equation has an F-statistic of 0.45 in the OLS model and a $\chi^2_{(4)}$ statistic of 2.84 in the Tobit model. In other words, the instrument does not enter the second stage regression. It can therefore be concluded that the instrument is satisfactory.

The T-statistic on π is 0.17 in equation (4.14) and 0.66 in equation (4.15). This means that in both cases $\pi = 0$ cannot be rejected. Thus, the analysis proceeds on the assumption that fairness perception of the wealth distribution is exogenous in the savings equation[36].

4.5.3 Results

4.5.3.1 *Basic Results*

Tables 4.7 and 4.8 present the basic results from the OLS model and the Tobit model respectively. In each case, the coefficients on the fairness perception dummies are positive and monotonically increasing. This suggest that monthly savings

[36]This implies that with respect to the validity of the estimates on F, time-varying unobservable characteristics and possible measurement error are not cause for concern.

and fairness perceptions of the wealth distribution are positively related rather than negatively related.

Looking at the results for the OLS model presented in Table 4.7, it is clear that the estimates for the full sample and the sample restricted to interior solutions are very similar. Concentrating on the estimates for the full sample, it is seen that an individual who disagrees that wealth is fairly distributed will save £5.236 more a month than an individual who strongly disagrees that it is. In the case of an individual who neither agrees nor disagrees that wealth is fairly distributed, monthly savings will exceed that of an individual who strongly disagrees that it is fair by £9.753. For an individual who believes that wealth is fairly distributed the difference is slightly bigger. Such an individual can be expected to save, on average, £10.382 more a month than one who strongly disagrees that it is.

The result for the tobit model are reported in Table 4.8. The coefficient estimates are shown in column 1. However, it is the marginal effects that are of main interest. These are presented in columns 2 and 3: the marginal effects relating to the probability that monthly savings is greater than zero are shown in column 2 and in column 3, the marginal effects for mean monthly savings, conditional on monthly savings being positive, are presented.

Based on the marginal effects in column 2, it can be said that an individual

who disagrees that wealth is fairly distributed is 1.8 percent more likely to save than one who strongly disagrees that it is. Further, according to the marginal effects in column 3, conditional on savings being greater than zero, an individual who disagrees that wealth is fairly distributed will save £2.807 more a month than an individual who strongly disagrees that it is.

It is also found that an individual who neither agrees nor disagrees that wealth is fairly distributed has a 3.9 percent higher probability of saving each month out of monthly income than one who strongly disagrees that it is. Moreover, conditional on savings being positive, such an individual will save £6.341 more a month than an individual who strongly disagrees that wealth is fairly distributed.

Similarly, an individual who agrees that wealth is fairly distributed is 4.2 percent more likely to save each month from monthly income than an individual who strongly disagrees. Correspondingly, given that monthly savings is greater than zero, the individual who agrees that wealth is fairly distributed will save £6.838 more a month than an individual who strongly disagrees. This is very close to the estimate for individuals who neither agree nor disagree relative to those who strongly disagree.

Not surprisingly, the OLS and tobit estimates are quantitatively different. Compared to the tobit marginal effects in column 3 of Table 4.8, it can be seen

that the OLS estimates are biased upwards. Nonetheless, they are qualitatively similar. They lead to the same conclusion that an individual's monthly savings will increase as his fairness perception of the wealth distribution becomes more favourable and as it becomes less favourable, the amount he saves on a monthly basis will fall. It is also reassuring to find that when divided by the proportion of non-limit observations, the tobit estimates in column 1 of Table 4.8 closely approximates the OLS estimates in column 1 of Table 4.7. Given that the estimates from the tobit model are more reliable, the rest of the analysis proceeds on the basis of equation (4.13).

The proposed intuition for the positive relationship between fairness perceptions of the wealth distribution and monthly savings is that an unfair wealth distribution leads individuals to spend more as they compete for higher economic status. When wealth is not distributed fairly, individuals may aspire to be as well off as those who are most advantaged and also to keep ahead of those who are less well off. Hence, they will spend more and save less (possibly increasing indebtedness) in an attempt to better their economic standing.

Besides being statistically significant, the estimates are plausible and economically important. Considering that the average weekly household expenditure on fuel and power in the UK for the five years up to 2000 was £13.04, it can be reasoned that compared to an individual who strongly disagrees that wealth is fairly

distributed, one who disagrees that it is would be saving an extra amount each year enough to fund 2.58 weeks of gas and electricity consumption. One who neither agrees nor disagrees and one who agrees would be saving an extra amount each year to fund 5.84 weeks and 6.29 weeks respectively of gas and electricity consumption. Thus, the difference in savings between individuals with different fairness perceptions of the wealth distribution is meaningful and may have consequences for the quality of life particularly after retirement[37].

4.5.3.2 *Interactions*

To gain an insight into whether or not income has a bearing on the relationship between fairness perceptions of the wealth distribution and savings, the fairness perception dummies are interacted with monthly income[38]. Here, fairness percep-

[37]The issue of gas and electricity consumption by pensioners is a serious one. Many pensioners in the UK die during the winter months because they cannot afford ample heating. It is often argued that the lack of sufficient spending by pensioners on heating is due to them having very low incomes. This under-funding of consumption after retirement is blamed partly on the inadequate savings by individuals during working life. As such, the findings indicate that fairness perceptions of the wealth distribution is an important factor that needs to be considered in addressing this issue.

[38]This includes both monthly labour income and monthly non-labour income, which is made up of pension income, benefit income, transfer income, and investment income.

tions of the wealth distribution is taken to be the focal independent variable and income, centred about its mean, the moderator variable. With this interaction, it can be judged whether the difference in the monthly savings of individuals with different fairness perceptions of the wealth distribution is affected given a change in monthly income.

When income changes, individuals' opinion of the fairness of the wealth distribution may also change. For instance, as income increases, individuals may be more predisposed to think that the wealth distribution is fair. Therefore, income may moderate the impact of fairness perceptions of the wealth distribution on monthly savings.

However, according to the estimates in column 1 of Table 4.9, there is no such interaction effect. This means that differences in monthly savings do not vary as a function of income. Nonetheless, there is still a significant positive relationship between fairness perceptions of the wealth distribution and monthly savings as shown by the 'pure effects' of the fairness perception dummies on monthly savings.

The impact that fairness perceptions of the wealth distribution have on monthly savings may also be influenced by age. With age, individuals may become more inured to unfairness. Also, their priorities may change and they may be less zealous about being a part of the 'rat race'. Therefore, it is possible that differences in the

savings behaviour of individuals with different fairness perceptions of the wealth distribution may diminish with age. This possibility is explored by interacting the fairness perception dummies with age centred about its mean. Again, fairness perceptions of the wealth distribution is taken to be the focal independent variable.

The results presented in Table 4.10 suggest that the relationship between savings and fairness perceptions of the wealth distribution is not dependent on age. The interaction effects are statistically insignificant. However, the 'pure effects' of the fairness perception dummies remain positive and significant.

4.5.3.3 *Gender Subsamples*

Considering the savings behaviour of male and female individuals separately, it appears that fairness perceptions of the wealth distribution have a similar impact on the savings behaviour of men and women. For both, the estimates are positive and monotonically increasing and with the exception of the estimate on the strongly disagree dummy, they are also statistically significant. The results are reported in Tables 4.11 and 4.12.

Based on the results in Table 4.11, a male individual who neither agrees nor disagrees that wealth is fairly distributed is 3.7 percent more likely to save out of monthly income than one who strongly disagrees that it is and given that savings

is positive, he can be expected to save £6.468 more a month. For a male individual who agrees that wealth is fairly distributed, the probability of saving each month out of monthly labour income is 3.9 percent higher than that of a male individual who strongly disagrees. Also, conditional on savings being positive, his savings out of monthly labour income can be expected to be higher by an average of £6.941 a month.

The results for female individuals, shown in Table 4.12, reveal that compared to a female individual who strongly disagrees that wealth is fairly distributed, one who neither agrees nor disagrees that it is has a 4.4 percent higher probability of saving out of monthly labour income whilst for one who agrees the probability is slightly higher at 4.8 percent. In addition, conditional on savings being positive, they can be expected to save £6.171 and £6.871 more a month respectively.

To illustrate the economic significance of these estimates, consider two individuals who are 25 years of age with the only difference between them being that one strongly disagrees that wealth is fairly distributed while the other believes that it is fairly distributed and suppose that they maintain their opinion of the fairness of the wealth distribution throughout their working lives. Assume further that individuals use all their savings to finance consumption after retirement and that the interest rate on savings is zero. Consider in the first instance that these two individuals are male with a life expectancy after retiring at age 65 of 15.7

years. Then from the estimates it can be deduced that the one who believes that wealth is fairly distributed will have £4.421 more to spend a week[39]. If these two individuals are female with a life expectancy after retiring at the age of 60 of 23 years, then one who believes that wealth is fairly distributed can be expected to have £2.147 more to spend a week[40] than the one who strongly disagrees that it is[41]. Though modest, the higher levels of savings by those who agree that wealth is fairly distributed is enough to contribute a significant amount to the cost of weekly gas and electricity consumption during retirement years.

4.5.3.4 *Race Subsamples*

Table 4.13 and 4.14, show the findings for the race subsamples. Table 4.13 presents the results for white individuals and Table 4.14, the results for non-white individuals.

For the sample of white individuals, the coefficient estimates on the fairness perception dummies are all positive, monotonically increasing, and statistically

[39]Equal to 33.90 percent of average weekly expenditure on gas and electricity in the UK.

[40]Equal to 16.47 percent of average weekly expenditure on gas and electricity in the UK.

[41]Life expectancy data after retirement for men and women was obtained from the Office of National Statistics (ONS) website.

significant. From these estimates, it is seen that a white individual who disagrees that wealth is fairly distributed will be 2.2 percent more likely to save each month out of income than one who disagrees and conditional on savings being being positive, will save £3.445 more a month. A white individual who neither agrees nor disagrees that wealth is fairly distributed has a 4.6 percent higher probability of saving out of monthly income than one who strongly disagrees. In addition, a white individual who neither agrees nor disagrees will, conditional on savings being positive, save £7.456 more a month than a white individual who strongly disagrees. In the case of a white individual who agrees that wealth is fairly distributed, the probability of saving out of monthly income is 5.2 percent higher than that of an individual who strongly disagrees and conditional on savings being greater than zero, can be expected to save £8.401 more a month[42].

In contrast to the other findings, there appears to be a negative relationship between savings and fairness perceptions of the wealth distribution for non-white individuals. This is evidenced by the negative and statistically significant coefficients on the fairness perception dummies. It should be noted however that the estimates are not strictly monotonically decreasing.

The estimates show that relative to a non-white individual who strongly dis-

[42]Given the small sample size, these results should be treated with caution.

agrees that wealth is fairly distributed, one who disagrees is 12.2 percent less likely to save a positive amount out of income. One who neither agrees nor disagrees is 18.0 percent less likely to save out of income whilst one who agrees has a 18.0 percent lower probability of saving out of income. In addition, conditional on savings being positive, the respective monthly savings can be expected to be £19.638 less, £27.213 less, and £27.430 less a month than the non-white individual who strongly disagrees that wealth is fairly distributed. However, it is clear that the estimate for non-white individuals who neither agree nor disagree and that for those who agree are almost identical.

Why would individuals save more when the wealth distribution is perceived to be unfair and less when it is perceived to be fair? Two plausible explanations can be offered. Firstly, when individuals believe that wealth is unfairly distributed, they may be prompted to be cautious about the future. More so than if they believe wealth is fairly distributed. They may anticipate the possibility that they are not likely to receive much help from society should they fall on hard times. Consequently, they will spend relatively less and save more in order to prevent a loss of welfare should their economic situation deteriorate in the future.

Secondly, it is possible that individuals may believe that when wealth is unfairly distributed, those who are disadvantaged may, because of envy or resentment, seek to cause harm to those who are seen to be better off. Hence, to reduce the chances

of being targeted, individuals may spend less than they would if instead they believed that they live in a world in which wealth is fairly distributed[43].

Based on earlier demonstrations, it can be rationalised that the estimates associated with the fairness perception dummies for both groups are, in economic terms, consequential. *Ceteris paribus*, it is expected that in comparison with their counterparts who agree, non-white individuals who strongly disagree that wealth is fairly distributed will be better off in terms of future consumption. Conversely, white individuals who strongly disagree will be less well off than their counterparts who agree.

4.6 Further Empirical Issues

To ascertain the constancy of the positive relationship between monthly savings and fairness perceptions of the wealth distribution that has been established so far, several auxiliary specifications of equation (4.14) are estimated. The most salient of these are discussed below[44].

[43]For instance, they may refrain from conspicuous consumption.

[44]It is worth briefly mentioning the following. A version of Equation 4.14 with net monthly income and its square was estimated. The estimates on the fairness perception dummies remained positive, monotonically increasing and statistically significant. Moreover, they were not markedly

4.6.1 Controlling for asset wealth

In the analysis, home ownership has been used not only to capture the differences in the savings behaviour of individuals with different home ownership status but also to proxy for asset wealth. Though a measure of property value is available, home ownership was used instead. The foremost reason for this is that the available measure of property value may not be reliable given that it is basically a guesstimate and in some cases the values are imputed. Nevertheless, there may be possible objections to the use of this indirect measure. Therefore, it is worthwhile checking whether using a more direct and possibly more informative measure of asset wealth would appreciably alter the results.

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different from those in Table 4.8. Interestingly, the estimates revealed that there is a hump-shaped relationship between savings and net income, with the maximum at £5738.418. Considering that education may have implications for individuals' awareness of the world and of issues of inequality, Equation 4.14 was also estimated for different education levels. It was found that the positive correlation between savings and fairness perceptions of the wealth distribution is present among individuals educated to the school level, the college level and the higher degree level. However, for all three groups, there was no statistically significant difference in the savings behaviour of those who strongly disagree that wealth is fairly distributed and those who disagree that it is. For the sample of individuals with no education, the estimates on the fairness perception dummies are positive and increasing but statistically insignificant. The data was further analysed for variation across regions and political affiliation. On the whole, region and political affiliation does not appear to matter significantly.

It is straightforward to determine whether the measure used matters for the conclusion drawn by assessing the consistency of the results when property value is used in place of home ownership. The results, shown in Table 4.A1 are similar to those in Table 4.8. Of particular interest are the estimates on the fairness perception dummies, which are still positive, monotonically increasing and statistically significant. In addition, they are of similar magnitude to those in Table 4.8[45]. Hence, the conclusion remains that for the average individual, there is a significant positive relationship between monthly savings and fairness perceptions of the wealth distribution.

4.6.2 Inclusion of the outliers

The stability of the estimates when the outliers are included are examined to give further assurance of the reliability of the findings. Equation (4.13) is re-estimated using the sample inclusive of the outliers. The results are presented in Table 4.A2.

The estimates of the impact of the fairness perceptions dummies are all positive and statistically significant but they are not strictly monotonically increasing. It can be seen that individuals who agree that wealth is fairly distributed are less

[45]It should be noted that the estimates for those who neither agree nor disagree and those who agree that wealth is fairly distributed are not very different.

likely to save than those who neither agree nor disagree that it is and conditional on savings being greater than zero, they also save less. Despite this, the estimates are similar in magnitude to those from the sample that excludes the outliers and the conclusion that is arrived at is essentially the same as before: for the average individual, there is a positive relationship between savings and fairness perceptions of the wealth distribution.

4.6.3 Heteroscedasticity and non-normality

It is also important to establish the robustness of the estimates to the possible presence of heteroscedasticity and non-normality. Wooldridge (2002) suggests a crude but reliable means of checking the validity of the tobit estimates. This involves comparing the tobit estimates divided by the standard error of the regression to the corresponding probit estimates. If these have the same sign and are of similar magnitude, then it can be argued that heteroscedasticity and non-normality are not of huge concern for the reliability of the tobit estimates.

Accordingly, the coefficient estimates from a correlated random effects probit model, presented in Table 4.A3, are compared to the tobit estimates in column 1 of Table 4.8 divided by 136.559. Paying attention to the estimates on the fairness perception dummies, it is seen that relative to those who strongly disagree that wealth is fairly distributed, the probit estimate for individuals who disagree is

0.060, for those who neither agree nor disagree, it is 0.173, and for those who agree, it is 0.106. Dividing the tobit estimates by 136.559 yields 0.059, 0.130, and 0.140 respectively. Clearly, the estimates have the same sign and are similar in magnitude. Hence, it can be surmised that the tobit estimates are valid.

This is reinforced by the estimates from a pooled tobit model with Huber-White standard errors. These are reported in Table 4.A4. The Huber-White standard errors allow valid statistical inference to be made about the coefficients in the presence of arbitrary heteroscedasticity and non-normality. The fact that the estimates from the pooled tobit model are positive and monotonically increasing as in the case of the correlated random effects tobit model and only slightly greater in magnitude suggests that the findings are robust to the possible problems of heteroscedasticity and non-normality.

4.7 Conclusions

Many countries today continue to face an alarmingly low savings rate. For instance, close to 50 percent of the UK population save nothing from current income. This is certainly a cause for concern for it paints a rather bleak picture of the future well-being of individuals both in terms of their ability to cope financially during rainy days of low income and also to finance consumption during retirement years.

Therefore, understanding the determinants of savings is a crucial step towards dealing with this worrying phenomenon.

An individual's decision to save is influenced by a myriad of things not least factors that characterise the economic environment. Yet, while there has been a plethora of studies on the determinants of savings, not many are known to have explored the impact of the economic environment, such as the distribution of wealth, on personal savings decisions. Of these studies the majority, if not all, are found in the macroeconomics literature. Indeed, the influence of the distribution of wealth on consumption and de facto savings has received due attention from macroeconomists but has been neglected by microeconomists. However, though analysis of the effect of the distribution of wealth on aggregate consumption and savings is indispensable, it would seem logical and perhaps necessary that the research proceeds further to investigate the related microeconomic behaviour. Furthermore, a potential drawback of these existing studies is that they tend to utilise some constructed measure of the distribution of wealth, which is often problematic. Besides, it is not clear that it is inequality represented by a statistical measure that matters for individual's consumption and savings decisions. Presumably, it is perceptions that motivate individual behaviour and of course, individuals' perceptions of the equality of the wealth distribution may not necessarily coincide with what these statistical measures describe. Hence, insofar as it is individuals' perceptions that

are likely to affect their motivations to consume and save, a more pertinent 'measure' would be *individuals' perceptions* of the equality of the wealth distribution.

Using panel data from the BHPS data set, this paper has sought to make an innovation to the study of savings behaviour by looking at the empirical relationship between personal savings and *perceptions* of how fairly wealth is distributed. The underlying theoretical framework is a simple consumption function, where savings is essentially the residual of income less consumption.

From the analysis, it emerges that the relationship between personal savings and perceptions of the fairness of the wealth distribution is predominantly positive. As fairness perceptions of the wealth distribution becomes less favourable the average individual is less likely to save and, conditional on savings being positive, will reduce monthly savings. A possible intuition for this positive relationship is as follows. As the wealth distribution becomes more unfair it induces individuals to discount the future more heavily and to place more weight on current consumption as they try to keep up with the Joneses and ahead of the Smiths. Thus, the demand for precautionary assets will fall. Nevertheless, as in the case of non-white individuals, the results reveal that there may be exceptions to this usual positive relationship. For this group, it is found that the probability of savings and the amount saved are likely to be higher the less favourable the fairness perception of the wealth distribution. One explanation that can be offered for this negative

relationship is that as the wealth distribution becomes more unfair, it engenders a greater sense of insecurity about the future. This causes individuals to weight the future more heavily and in turn leads to an increase in the demand for precautionary assets. Another reason could be that individuals reduce (conspicuous) consumption so as not to attract resentment from those who are less well off. Various checks confirmed that these empirical regularities are robust and are not mere artefacts of the specification or method of estimation.

In terms of policy agenda, the findings here imply that redistributive policies can be used to influence savings behaviour. Specifically, the findings suggest that policies geared at equalizing the distribution of wealth would help dampen the motivations for under saving.

As a contribution to the literature on savings and also the debate on the relationship between the distribution of income and consumption, this study should be seen as the first attempt to quantify the economic implications of *perceptions* of the wealth distribution on personal savings. Of course, further research is needed to determine how far the findings here can be generalised.

Table 4.1: Descriptive Statistics

Variable	Mean	(Std Dev)
Age	37.033	(11.123)
Total Income	1,176.428	(833.814)
Monthly Net Labour Income	881.937	(558.117)
Monthly Non-labour income	71.436	(215.442)
Monthly Household Income	1,188.129	(1,130.825)
Monthly Savings	67.360	(120.740)
Fairness Opinion of the Wealth Distribution (4)	2.331	(0.876)
Marital Status (5)	2.396	(1.793)
Home Ownership (3)	2.109	(0.568)
House Value	62,256.610	(58,413.940)
Household Size	3.037	(1.236)
Responsible for children 16yrs and under (2)	0.190	(0.393)
Health Status (5)	1.966	(0.810)
Future financial Status Expectation (3)	2.169	(0.933)
Employer Pension Provision (2)	0.5167	(0.500)
Sample size (person-year observations)	22,400	

Notes:(1) Std Dev = Standard Deviations.

Table 4.2: Mean savings and average propensity to save for individual characteristics

Variable	% who save	Average Savings	APS
All	51.076	67.360	0.065
Gender:			
Male	50.955	74.819	0.054
Female	51.197	59.888	0.075
Race:			
White	51.085	67.259	0.065
Non-white	50.772	70.332	0.065
Age:			
16–24 years	50.075	55.141	0.092
25–34 years	53.102	72.274	0.063
35–44 years	49.682	64.619	0.054
45–54 years	51.126	71.748	0.063
55–64 years	49.874	70.054	0.062
Income:			
First quartile	39.929	32.615	0.092
Second quartile	48.268	49.623	0.060
Third quartile	52.750	64.301	0.052
Fourth quartile	63.357	122.900	0.055
Fairness of the wealth distribution:			
Strongly disagree	45.702	54.096	0.054
Disagree	49.948	64.118	0.061
Neither agree/disagree	55.130	73.385	0.073
Agree	54.859	84.794	0.076

Notes:(1) APS = Average propensity to save.

Table 4.3: Reasons for savings

Reasons	Waves					
	1991	1993	1995	1997	2000	Total
Holidays	20.49	20.18	18.93	20.75	24.42	21.33
Old age	9.61	7.79	6.33	6.72	8.43	7.83
Car	4.91	3.73	5.09	4.30	2.77	4.02
Children	2.63	3.46	3.59	3.45	3.89	3.45
House purchase	5.87	6.76	6.38	7.04	6.82	6.61
Home improvement	4.25	3.84	3.49	3.99	3.67	3.84
Household bills	0.46	1.14	0.75	1.08	1.13	0.93
Special events	5.46	5.90	5.68	6.01	5.69	5.75
No specific reason	40.16	42.75	46.76	43.93	39.32	42.23
Other	6.17	4.44	3.00	2.73	3.86	4.00
Total	100.00	100.00	100.00	100.00	100.00	100.00

Columns may not sum due to rounding.

Table 4.4: Fairness perceptions of the wealth distribution across waves

Fairness perceptions	**Waves**					
	1991	1993	1995	1997	2000	Total
Strongly Disagree	21.80	14.93	15.06	10.23	11.09	14.12
Disagree	41.92	54.94	56.67	51.88	53.63	51.85
Neither Agree/Disagree	17.60	18.16	17.49	25.82	22.71	20.84
Agree	18.68	11.98	10.78	12.07	12.57	13.18
Total	100.00	100.00	100.00	100.00	100.00	100.00

Columns may not sum due to rounding.

Table 4.5: Mean savings by fairness perceptions of the wealth distribution

Variable	Strongly disagree	Disagree	Neither agree/disagree	Agree
All	54.096	64.118	73.385	84.794
Gender:				
Male	56.899	71.161	80.565	96.558
Female	50.975	57.587	66.821	68.270
Race:				
White	53.559	63.905	73.509	85.624
Non-white	70.849	70.509	66.883	72.481
Age:				
16–24 years	49.304	52.561	54.160	68.717
25–34 years	60.620	69.812	75.710	88.200
35–44 years	49.944	60.598	77.232	80.789
45–54 years	52.534	68.911	81.547	95.669
55–64 years	57.734	61.264	92.543	91.112
Income:				
First quartile	27.028	30.594	38.514	37.036
Second quartile	41.258	47.285	53.937	62.527
Third quartile	58.369	61.636	69.535	75.448
Fourth quartile	94.213	119.129	129.872	147.834

Table 4.6: Mean average propensity to save by fairness perceptions of the wealth distribution

Variable	Strongly disagree	Disagree	Neither agree/disagree	Agree
All	0.054	0.061	0.073	0.076
Gender:				
Male	0.045	0.051	0.060	0.069
Female	0.065	0.071	0.085	0.087
Race:				
White	0.054	0.061	0.073	0.077
Non-white	0.058	0.057	0.074	0.080
Age:				
16–24 years	0.082	0.082	0.094	0.121
25–34 years	0.058	0.060	0.066	0.072
35–44 years	0.043	0.053	0.067	0.055
45–54 years	0.051	0.063	0.068	0.074
55–64 years	0.054	0.057	0.081	0.071
Education:				
None	0.046	0.055	0.069	0.064
School level	0.056	0.060	0.072	0.078
College level	0.059	0.068	0.076	0.084
Degree level	0.054	0.063	0.068	0.078
Income:				
First quartile	0.075	0.084	0.112	0.105
Second quartile	0.050	0.057	0.066	0.077
Third quartile	0.047	0.049	0.056	0.061
Fourth quartile	0.043	0.054	0.059	0.063

Table 4.7: Impact of fairness perceptions of the wealth distribution on monthly savings *OLS within group estimates*

Monthly Savings	*Full Sample*		*Interior solutions (savings>0)*	
Age	-8.719**	(3.994)	-10.313	(7.177)
Age squared/100	3.970***	(1.449)	4.237	(2.592)
Net monthly labour income	0.047***	(0.003)	0.078***	(0.006)
Non-labour income	0.013***	(0.004)	0.045***	(0.010)
Other household income	0.010***	(0.001)	0.013***	(0.002)
Household size	-5.654***	(1.334)	-9.537***	(2.479)
Responsible for children $\leq$ 16yrs	4.945	(4.168)	1.750	(7.501)
[a]Home ownership:				
Owner mortgage	-23.627***	(4.428)	-34.193***	(7.167)
Rented	-10.487**	(5.419)	-7.834	(9.432)
[b]Future Financial status expectation:				
Better than now	-4.638**	(2.036)	1.575	(3.549)
Worse than now	8.282***	(2.926)	12.327***	(4.950)
Employer pension provision	3.840	(2.765)	-0.061	(5.173)
[c]***Fairness of wealth distribution:***				
Disagree	5.236*	(2.836)	9.526*	(5.251)
Neither Agree/Disagree	9.753***	(3.547)	11.169*	(6.325)
Agree	10.382***	(4.002)	13.709**	(6.982)
Prob > F		0.000		0.000
R^2		0.046		0.096
Number of observations [individuals]	22,400 [10,213]		11,441 [6,279]	

Notes: (1) ***, **, * denotes significance at the 1% level, 5% level, and the 10% level respectively. (2) Standard errors are in parenthesis. (3)Marital Status, Health Status and year dummies are included. (4) Omitted categories: (a) Owner, (b) Stay the same, (c) Strongly disagree.

Table 4.8: Impact of fairness perceptions of the wealth distribution on monthly savings *Correlated Random Effects Tobit estimates*

Monthly Savings	Coefficient		Pr(savings>0)		E(savings|savings>0)	
Age	-4.091*	(2.162)	-0.009*	(0.005)	-1.431*	(0.756)
Age squared/100	8.577***	(2.535)	0.019***	(0.006)	3.000***	(0.887)
Net monthly labour income	0.072***	(0.005)	0.016E-02***	(0.001E-02)	0.025***	(0.002)
Non-labour income	0.016***	(0.007)	0.004E-02***	(0.001E-02)	0.006***	(0.002)
Other household income	0.017***	(0.002)	0.004E-02***	(0.000)	0.006***	(0.001)
Household size	-11.341***	(2.367)	-0.025***	(0.005)	-3.967***	(0.828)
Responsible for children $\leq$ 16yrs	13.691*	(7.460)	0.030*	(0.017)	4.790*	(2.610)
[a]Home ownership:						
Owner mortgage	-20.688***	(6.011)	-0.046***	(0.013)	-7.322***	(2.153)
Rented	-9.928	(9.426)	-0.022	(0.021)	-3.441	(3.237)
[b]Future Financial status expectation:						
Better than now	-10.618***	(3.603)	-0.023***	(0.008)	-3.697***	(1.249)
Worse than now	7.455*	(4.361)	0.017*	(0.010)	2.634*	(1.557)
Employer pension provision	15.358***	(4.973)	0.034***	(0.011)	5.368***	(1.737)
[c]*Fairness of wealth distribution:*						
Disagree	8.027*	(4.305)	0.018*	(0.010)	2.807*	(1.504)
Neither Agree/Disagree	17.811***	(5.681)	0.039***	(0.013)	6.341***	(2.059)
Agree	19.090***	(6.948)	0.042***	(0.015)	6.838***	(2.548)
Log likelihood						-81,321.987
Number of observations [individuals]						22,400 [10,213]
Number of uncensored observations						11,441
Sigma u						136.559

Notes: (1) ***, **, * denotes significance at the 1% level, 5% level, and the 10% level respectively. (2) Standard errors are in parenthesis. (3) Marital Status, Health Status year dummies , and the average of all the explanatory variables are included. (4) Omitted categories: (a) Owner outright, (b) About the same, (c) Strongly disagree.

Table 4.9: Impact of fairness perceptions of the wealth distribution on monthly savings *Correlated Random Effects Tobit estimates – Income interactions*

Monthly Savings	Coefficient		Pr(savings>0)		E(savings|savings>0)	
Age	-2.062	(2.132)	-0.005	(0.005)	-0.722	(0.746)
Age squared/100	6.312***	(2.518)	0.014***	(0.006)	2.211***	(0.882)
Mean monthly income	0.035***	(0.005)	0.008E-02***	(0.001E-02)	0.012***	(0.002)
Other household income	0.017***	(0.002)	0.004E-02***	(0.000)	0.006***	(0.001)
Household size	-11.709***	(2.368)	-0.026***	(0.005)	-4.101***	(0.829)
Responsible for children $\leq$ 16yrs	18.089**	(7.426)	0.040**	(0.016)	6.336**	(2.601)
[a]Home ownership:						
Owner mortgage	-23.390***	(6.016)	-0.052***	(0.013)	-8.302***	(2.164)
Rented	-10.419	(9.433)	-0.023	(0.021)	-3.614	(3.241)
[b]Future Financial status expectation:						
Better than now	-10.343***	(3.607)	-0.023***	(0.008)	-3.606***	(1.252)
Worse than now	6.788	(4.361)	0.015	(0.010)	2.399	(1.556)
Employer pension provision	14.300***	(4.991)	0.032***	(0.011)	5.005***	(1.746)
[c]***Fairness of wealth distribution:***						
Disagree	8.527**	(4.305)	0.019**	(0.010)	2.985**	(1.507)
Neither Agree/Disagree	18.206***	(5.686)	0.040***	(0.013)	6.492***	(2.065)
Agree	20.600***	(6.975)	0.046***	(0.016)	7.403***	(2.572)
[d]***Interactions:***						
(x Mean monthly income)						
Disagree	0.002	(0.005)	0.004E-03	(0.001E-02)	0.001	(0.002)
Neither Agree/Disagree	0.004	(0.006)	0.008E-03	(0.001E-02)	0.001	(0.002)
Agree	-0.002	(0.006)	-0.004E-03	(0.001E-02)	-0.001	(0.002)
Log likelihood						-81,293.072
Number of observations [individuals]						22,400 [10,213]
Number of uncensored observations						11,441
Sigma u						136.711

Notes: (1) ***, **, * denotes significance at the 1% level, 5% level, and the 10% level respectively. (2) Standard errors are in parenthesis. (3)Marital Status, Health Status year dummies , and the average of all the explanatory variables are included. (4) Omitted categories: (a) Owner outright, (b) About the same, (c) Strongly disagree, (d) Strongly disagree x mean monthly income.

Table 4.10: Impact of fairness perceptions of the wealth distribution on monthly savings *Correlated Random Effects Tobit estimates – Age interactions*

Monthly Savings	Coefficient		Pr(savings>0)		E(savings|savings>0)	
Mean age	-4.123*	(2.178)	-0.009*	(0.005)	-1.442*	(0.762)
Age squared/100	8.451***	(2.452)	0.019***	(0.006)	2.057***	(0.889)
Net monthly labour income	0.072***	(0.005)	0.016E-02***	(0.001E-02)	0.025***	(0.002)
Monthly non-labour income	0.016***	(0.007)	0.004E-02***	(0.001E-02)	0.006***	(0.002)
Other household income	0.017***	(0.002)	0.004E-02***	(0.000)	0.006***	(0.001)
Household size	-11.359***	(2.368)	-0.025***	(0.005)	-3.974***	(0.828)
Responsible for children $\leq$ 16yrs	13.725*	(7.460)	0.030*	(0.017)	4.802*	(2.610)
[a]Home ownership:						
Owner mortgage	-20.595***	(6.012)	-0.046***	(0.013)	-7.289***	(2.153)
Rented	-9.892	(9.427)	-0.022	(0.021)	-3.429	(3.238)
[b]Future Financial status expectation:						
Better than now	-10.584***	(3.604)	-0.023***	(0.008)	-3.685***	(1.249)
Worse than now	7.423*	(4.362)	0.016*	(0.010)	2.623*	(1.556)
Employer pension provision	15.337***	(4.973)	0.034***	(0.011)	5.361***	(1.738)
[c]***Fairness of wealth distribution:***						
Disagree	7.926*	(4.326)	0.018**	(0.010)	2.771*	(1.512)
Neither Agree/Disagree	18.214***	(5.711)	0.040***	(0.013)	6.487***	(2.071)
Agree	18.967***	(6.958)	0.042***	(0.015)	6.793***	(2.551)
[d]***Interactions:***						
(x Mean age)						
Disagree	0.089	(0.364)	0.020E-02	(0.081E-02)	0.031	(0.127)
Neither Agree/Disagree	0.356	(0.427)	0.079E-02	(0.095E-02)	0.125	(0.149)
Agree	-0.045	(0.450)	-0.010E-02	(0.100E-02)	-0.016	(0.158)
Log likelihood						-81,321.328
Number of observations [individuals]						22,400 [10,213]
Number of uncensored observations						11,441
Sigma u						136.565

Notes: (1) ***, **, * denotes significance at the 1% level, 5% level, and the 10% level respectively. (2) Standard errors are in parenthesis. (3) Marital Status, Health Status year dummies , and the average of all the explanatory variables are included. (4) Omitted categories: (a) Owner outright, (b) About the same, (c) Strongly disagree, (d) Strongly disagree x mean age.

Table 4.11: Impact of fairness perceptions of the wealth distribution on monthly savings *Correlated Random Effects Tobit estimates – Men*

Monthly Savings	Coefficient		Pr(savings>0)		E(savings|savings>0)	
Age	-7.660**	(3.183)	-0.015**	(0.006)	-2.686**	(1.115)
Age squared/100	12.869***	(3.685)	0.026***	(0.007)	4.512***	(1.292)
Net monthly labour income	0.072***	(0.007)	0.015E-02***	(0.002E-02)	0.025***	(0.003)
Non-labour income	0.043***	(0.015)	0.009E-02***	(0.003E-02)	0.0015***	(0.005)
Other household income	0.016***	(0.003)	0.003E-02***	(0.001)	0.006***	(0.001)
Household size	-16.027***	(3.342)	-0.032***	(0.007)	-5.619***	(1.172)
Responsible for children $\leq$ 16yrs	-36.237	(34.385)	-0.073	(0.069)	-12.704	(12.055)
[a]Home ownership:						
Owner mortgage	-32.997***	(9.017)	-0.066***	(0.018)	-11.768***	(3.274)
Rented	-12.995	(14.040)	-0.026	(0.028)	-4.506	(4.815)
[b]Future Financial status expectation:						
Better than now	-1.463	(5.418)	-0.003	(0.011)	-0.513	(1.898)
Worse than now	1.361	(6.658)	0.003	(0.013)	0.478	(2.341)
Employer pension provision	16.794**	(7.759)	0.034**	(0.016)	5.867**	(2.700)
[c]***Fairness of wealth distribution:***						
Disagree	9.834	(6.475)	0.020	(0.013)	3.448	(2.272)
Neither Agree/Disagree	18.143**	(8.585)	0.037**	(0.017)	6.468**	(3.113)
Agree	19.395*	(10.161)	0.039*	(0.020)	6.941*	(3.711)
Log likelihood						-41,072.225
Number of observations [individuals]						11,201 [5,091]
Number of uncensored observations						5,712
Sigma u						146.060

Notes: (1) ***, **, * denotes significance at the 1% level, 5% level, and the 10% level respectively. (2) Standard errors are in parenthesis. (3) Marital Status, Health Status year dummies , and the average of all the explanatory variables are included. (4) Omitted categories: (a) Owner outright, (b) About the same, (c) Strongly disagree.

Table 4.12: Impact of fairness perceptions of the wealth distribution on monthly savings *Correlated Random Effects Tobit estimates – Women*

Monthly Savings	Coefficient		Pr(savings>0)		E(savings|savings>0)	
Age	-0.064	(2.906)	-0.016E-02	(0.007)	-0.022	(1.016)
Age squared/100	3.215	(3.457)	0.008	(0.009)	1.124	(1.208)
Net monthly labour income	0.077***	(0.008)	0.019E-02***	(0.002E-02)	0.027***	(0.003)
Non-labour income	0.009	(0.007)	0.002E-02	(0.002E-02)	0.003	(0.002)
Other household income	0.015***	(0.002)	0.004E-02***	(0.001)	0.005***	(0.001)
Household size	-1.672	(3.398)	-0.004	(0.009)	-0.584	(1.187)
Responsible for children $\leq$ 16yrs	26.403***	(7.550)	0.066***	(0.019)	9.227***	(2.639)
[a]Home ownership:						
Owner mortgage	-6.509	(7.839)	-0.016	(0.020)	-2.284	(2.762)
Rented	-2.958	(12.424)	-0.007	(0.031)	-1.031	(4.315)
[b]Future Financial status expectation:						
Better than now	-19.171***	(4.698)	-0.048***	(0.012)	-6.623***	(1.605)
Worse than now	13.384**	(5.576)	0.034**	(0.014)	4.774**	(2.030)
Employer pension provision	14.935**	(6.288)	0.038**	(0.016)	5.231**	(2.208)
[c]***Fairness of wealth distribution:***						
Disagree	5.896	(5.597)	0.015	(0.014)	2.059	(1.953)
Neither Agree/Disagree	17.332**	(7.378)	0.044**	(0.019)	6.171**	(2.677)
Agree	19.110**	(9.342)	0.048**	(0.024)	6.871**	(3.456)
Log likelihood						-40,055.482
Number of observations [individuals]						11,190 [5,122]
Number of uncensored observations						5,729
Sigma u						124.745

Notes: (1) ***, **, * denotes significance at the 1% level, 5% level, and the 10% level respectively. (2) Standard errors are in parenthesis. (3) Marital Status, Health Status year dummies , and the average of all the explanatory variables are included. (4) Omitted categories: (a) Owner outright, (b) About the same, (c) Strongly disagree.

Table 4.13: Impact of fairness perceptions of the wealth distribution on monthly savings *Correlated Random Effects Tobit estimates – White*

Monthly Savings	Coefficient		Pr(savings>0)		E(savings|savings>0)	
Age	-4.688**	(2.188)	-0.010**	(0.005)	-1.640**	(0.765)
Age squared/100	9.100***	(2.565)	0.020***	(0.006)	3.183***	(0.897)
Net monthly labour income	0.077***	(0.006)	0.017E-02***	(0.001E-02)	0.027***	(0.002)
Non-labour income	0.016**	(0.007)	0.004E-02**	(0.001E-02)	0.006**	(0.002)
Other household income	0.017***	(0.002)	0.004E-02***	(0.000)	0.006***	(0.001)
Household size	-11.609***	(2.417)	-0.026***	(0.005)	-4.061***	(0.845)
Responsible for children $\leq$ 16yrs	12.866*	(7.552)	0.029*	(0.017)	4.501*	(2.642)
[a]Home ownership:						
Owner mortgage	-20.896***	(6.101)	-0.046***	(0.014)	-7.398***	(2.186)
Rented	-11.591	(9.549)	-0.026	(0.021)	-4.011	(3.269)
[b]Future Financial status expectation:						
Better than now	-11.110***	(3.649)	-0.025***	(0.008)	-3.867***	(1.264)
Worse than now	6.984	(4.430)	0.016	(0.010)	2.466	(1.579)
Employer pension provision	15.296***	(5.047)	0.034***	(0.011)	5.347***	(1.763)
[c]***Fairness of wealth distribution:***						
Disagree	9.854**	(4.362)	0.022**	(0.010)	3.445**	(1.524)
Neither Agree/Disagree	20.879***	(5.762)	0.046***	(0.013)	7.456***	(2.101)
Agree	23.324***	(7.060)	0.052***	(0.016)	8.401***	(2.618)
Log likelihood						-78,455.457
Number of observations [individuals]						21,621 [9,837]
Number of uncensored observations						11,045
Sigma u						136.027

Notes: (1) ***, **, * denotes significance at the 1% level, 5% level, and the 10% level respectively. (2) Standard errors are in parenthesis. (3) Marital Status, Health Status year dummies , and the average of all the explanatory variables are included. (4) Omitted categories: (a) Owner outright, (b) About the same, (c) Strongly disagree.

Table 4.14: Impact of fairness perceptions of the wealth distribution on monthly savings *Correlated Random Effects Tobit estimates – Non-white*

Monthly Savings	Coefficient		Pr(savings>0)		E(savings|savings>0)	
Age	25.224*	(15.134)	0.054*	(0.032)	8.629*	(5.178)
Age squared/100	-22.651	(17.733)	-0.048	(0.038)	-7.749	(6.067)
Net monthly labour income	-0.014	(0.029)	-0.003E-02	(0.006E-02)	-0.005	(0.010)
Non-labour income	0.031	(0.052)	0.007E-02	(0.011E-02)	0.011	(0.018)
Other household income	0.011	(0.014)	0.002E-02	(0.003E-02)	0.004	(0.005)
Household size	2.465	(13.525)	0.005	(0.029)	0.843	(4.627)
Responsible for children $\leq$ 16yrs	40.116	(50.735)	0.086	(0.109)	13.724	(17.351)
[a]Home ownership:						
Owner mortgage	10.238	(38.807)	0.022	(0.083)	3.490	(13.183)
Rented	76.695	(61.582)	0.164	(0.130)	27.984	(23.957)
[b]Future Financial status expectation:						
Better than now	1.885	(22.965)	0.004	(0.049)	0.645	(7.863)
Worse than now	5.985	(27.231)	0.013	(0.058)	2.063	(9.455)
Employer pension provision	-13.682	(30.126)	-0.029	(0.064)	-4.690	(10.347)
[c]***Fairness of wealth distribution:***						
Disagree	-57.394**	(27.095)	-0.122**	(0.057)	-19.638**	(9.274)
Neither Agree/Disagree	-87.054**	(35.814)	-0.180**	(0.070)	-27.213**	(10.220)
Agree	-86.975**	(39.787)	-0.180**	(0.079)	-27.430**	(11.572)
Log likelihood						-2,344.108
Number of observations [individuals]						648 [305]
Number of uncensored observations						329
Sigma u						140.275

Notes: (1) ***, **, * denotes significance at the 1% level, 5% level, and the 10% level respectively. (2) Standard errors are in parenthesis. (3) Marital Status, Health Status year dummies , and the average of all the explanatory variables are included. (4) Omitted categories: (a) Owner outright, (b) About the same, (c) Strongly disagree.

Bibliography

[1] Alessie, Rob, and Arie Kapteyn (2001), "New Data for Understanding Saving", *Oxford Review of Economic Policy*, 17(1):55–69.

[2] Amiel, Yoram (1999), "The Subjective Approach to the Measurement of Income Inequality", *Handbook of Income Inequality Measurement*, pg.227–241, J. Silber (ed), Boston: Kluwer Academic Publishers.

[3] Attanasio, Orazio, and James Bank (2001), "The Assessment: Household Saving – Issues in Theory and Policy", *Oxford Review of Economic Policy*, 17(1):1–19.

[4] Banks, James, Richard Blundell, and James P. Smith (2000), "Wealth Inequality in the United States and Great Britain", *Institute for Fiscal Studies Working Papers*, WP 00/20.

[5] Blinder, Alan (1975), "Distribution Effects and the Aggregate Consumption Function", *The Journal of Political Economy*, 83(3):447–476.

[6] Bound, John, David A. Jaeger, and Regina M. Baker (1995), "Problems with Instrumental Variables Estimation When the Correlation Between the Instruments and the Endogenous Explanatory Variable is Weak", *Journal of the American Statistical Association*, 90(430):443–450.

[7] Browning, Martin, and Annamaria Lusardi (1996), "Household Saving: Micro Theories and Micro Facts", *Journal of Economic Literature*, 34(4):1797–1855.

[8] Burniaux, Jean-Marc, Thai-Thanh Dang, Douglas Fore, Michael Foster, Marco Mira d'Ercole and Howard Oxley (1998), "Income Distribution and Poverty in Selected OECD Countries" *OECD Economics Department Working Papers*, Working Paper No. 189.

[9] Chamberlain, Gary (1984), "Panel Data", *Handbook of Econometrics*, pg 1247–1318, Z. Griliches and M.D. Intriligator (ed), Volume 2 Amsterdam: North Holland.

[10] Corneo, Giacomo, and Olivier Jeanne (1998), "Social Organization, Status, and Savings Behaviour", *Journal of Public Economics*, 70:37–51.

[11] Corneo, Giacomo, and Olivier Jeanne (1999), "Social Organization in an Endogenous Growth Model", *International Economic Review*, 40(3):711–725.

[12] Della Valle, Philip A., and Noriyoshi Oguchi (1976), "Distribution, the Aggregate Consumption Function, and the Level of Economic Development: Some Cross-Country Results", *The Journal of Political Economy*, 84(6):1325–1334.

[13] de Serres, Alain, and Florian Pelgrin (2002), "The Decline in Private Saving Rates in the 1990s in OECD Countries: How Much Can be Explained by Non-Wealth Determinants", *OECD Economics Department Working Papers*, Working Paper No. 344.

[14] Duesenberry, James S., (1949), *Income, Saving, and the Theory of Consumer Behaviour*, Cambridge MA: Harvard University Press.

[15] Dynan, Karen (1993), "How Prudent are Consumers?", *Journal of Political Economy*, 101(6):(1104–1113.

[16] Greene, William H. (2000), *Econometric Analysis*, 4^{th} Edition, New Jersey: Prentice Hall International, Inc.

[17] Fisher, Irving., (1936), *The Theory of Interest*, London: Macmillan

[18] Föster, Michael, and Mark Pearson (2002), "Income Distribution and Poverty in the OECD Area: Trends and Driving Forces" *OECD Economic Studies*, No. 34, 2002/I.

[19] Friedman, Milton (1957), *A Theory of the Consumption Function*, Princeton New Jersey: Princeton University Press.

[20] Harbaugh, Richmond (1996), "Falling Behind the Joneses: Relative Consumption and the Growth-Savings Paradox", *Economic Letters*, 53:297–304.

[21] Hausman, Jerry A. (1978), "Specification Tests in Econometrics", *Econometrica*, 46:1251-1271.

[22] Hausman, Jerry A. (1983), "Specification and Estimation of Simultaneous Equation Models", *Handbook of Econometrics*, pg 391–448, Z. Griliches and M.D. Intriligator (ed), Volume 1 Amsterdam: North Holland.

[23] Katona, George (1975), *Psychological Economics*, New York: Elsevier.

[24] Kelly, Morgan (2000), "Inequality and Crime", *The Review of Economics and Statistics*, 82(4):530–539.

[25] Keynes, John M., (1936), *The General Theory of Employment, Interest and Money*, London: Macmillan

[26] Lubell, Harold (1947), "Effects of Redistribution of Income on Consumers' Expenditures", *The American Economic Review*, 37(1):157–170.

[27] Lunt, Peter (1996), "Discourses of Savings", *Journal of Economic Psychology*, 17:677–690.

[28] Lunt, Peter K., and Sonia M. Livingstone (1991), "Psychological, Social and Economic Determinants of Saving: Comparing recurrent and Total Savings", *Journal of Economic Psychology*, 12:621–641.

[29] Metcalf, Charles E., (1972), *An Econometric Model of the Income Distribution*, Chicago: Markham Publishing Company

[30] Miles, David (1997), "A Household Level Study of the Determinants of Incomes and Consumption", *The Economic Journal*, 107:1–25.

[31] Modigliani, Franco. and Richard Brumberg (1954), "Utility Analysis and the Consumption Function: An Interpretation of Cross-Section Data" in Kenneth K. Kurihara, ed., *Post-Keynesian Economics*, p. 388-436. New Brunswick, N.J.: Rutgers University Press

[32] Moulton, Harold G., (1935), *Income and Economic Progress*, Washington: The Brookings Institution

[33] OECD Economic Outlook: Special Focus on Fiscal Policy and Institutions, December No. 74 Volume 2003 Issue 2

[34] Rabin, Matthew (2002), "A Perspective on Psychology and Economics", *European Economic Review*, 46:657–685.

[35] Robson, Arthur J. (1992), "Status, the Distribution of Wealth, Private and Social Attitudes to Risk", *Econometrica*, 60(4):837–857.

[36] Staiger, Douglas, and James H. Stock (1997), "Instrumental Variables Regression with Weak Instruments", *Econometrica*, 65(3):557–586.

[37] Smith, Richard J., and Richard W. Blundell (1986), "An Exogeneity Test for the Simultaneous Equation Tobit Model with an Application to Labor Supply", *Econometrica*, 54:679-685.

[38] Taylor, M.F (ed. with J. Brice *et al*) (1996), *British Household Panel Survey User Manual Volumes A and B*, University of Essex, Colchester.

[39] Tobin, James (1958) "Estimation of Relationships for Limited Dependent Variables," *Econometrica*, 26 (1): 24-36.

[40] van Praag, Bernard M.S. (1977), "The Perception of Welfare Inequality", *European Economic Review*, 10:189–207.

[41] van Praag, Bernard M.S. (1978), "The Perception of Income Inequality", *Personal Income Distribution*, W. Krelle, and A.F. Shorrocks (ed), North Holland, Amsterdam.

[42] van Praag, Bernard M.S., Aldi Hagenaars, and Wim van Eck (1983), "The Influence of Classification and Observation on the Measurement of Income Inequality", *Econometrica*, 51(4):1093–1108.

[43] van Veldhoven, Gery M., and Edward A.G. Groenland (1993), "Exploring Saving Behaviour: A Framework and a Research Agenda", *Journal of Economic Psychology*, 14:507–522.

[44] Wärneryd, Karl-Erik (1989), "On the Psychology of Saving: An Essay on Economic Behaviour", *Journal of Economic Psychology*, 10:515–541.

[45] Wooldridge, Jeffrey M. (2002), *Econometric Analysis of Cross Section and Panel Data*, United States: MIT.

4.8 Appendix 4A

Table 4.A1: Impact of fairness perceptions of the wealth distribution on monthly savings *Correlated Random Effects Tobit estimates – Controlling for asset wealth*

Monthly Savings	Coefficient		Pr(savings>0)		E(savings|savings>0)	
Age	-4.472**	(2.157)	-0.010**	(0.005)	-1.564**	(0.754)
Age squared/100	9.929***	(2.521)	0.022***	(0.006)	3.471***	(0.881)
Net monthly labour income	0.074***	(0.005)	0.016E-02***	(0.001E-02)	0.026***	(0.002)
Non-labour income	0.017***	(0.007)	0.004E-02***	(0.001E-02)	0.006***	(0.002)
Other household income	0.017***	(0.002)	0.004E-02***	(0.000)	0.006***	(0.001)
Household size	-10.317***	(2.388)	-0.023***	(0.005)	-3.607***	(0.835)
Responsible for children $\leq$ 16yrs	13.184*	(7.461)	0.029*	(0.016)	4.609*	(2.608)
Property value	-0.010E-02**	(0.005E-02)	-0.220E-06**	(0.000)	-0.004E-02**	(0.002E-02)
[a]Future Financial status expectation:						
Better than now	-10.554***	(3.604)	-0.023***	(0.008)	-3.6727***	(1.248)
Worse than now	7.878*	(4.369)	0.017*	(0.010)	2.783*	(1.560)
Employer pension provision	15.111***	(4.976)	0.033***	(0.011)	5.279***	(1.737)
[b]*Fairness of wealth distribution:*						
Disagree	8.576**	(4.312)	0.019**	(0.009)	2.997**	(1.506)
Neither Agree/Disagree	18.291***	(5.686)	0.040***	(0.013)	6.510***	(2.061)
Agree	18.867***	(6.950)	0.042***	(0.015)	6.751***	(2.545)
Log likelihood						-81,382.939
Number of observations [individuals]						22,400 [10,213]
Number of uncensored observations						11,441
Sigma u						136.536

Notes: (1) ***, **, * denotes significance at the 1% level, 5% level, and the 10% level respectively. (2) Standard errors are in parenthesis. (3) Marital Status, Health Status year dummies , and the average of all the explanatory variables are included. (4) Omitted categories: (a) About the same, (b) Strongly disagree.

Table 4.A2: Impact of fairness perceptions of the wealth distribution on monthly savings *Correlated Random Effects Tobit estimates – Including outliers*

Monthly Savings	Coefficient		Pr(savings>0)		E(savings|savings>0)	
Age	-6.324***	(2.568)	-0.012**	(0.005)	-2.149**	(0.872)
Age squared/100	11.102***	(3.022)	0.021***	(0.006)	3.772***	(1.027)
Net monthly labour income	0.127***	(0.006)	0.024E-02***	(0.001E-02)	0.043***	(0.002)
Non-labour income	0.053***	(0.008)	0.010E-02***	(0.001E-02)	0.018***	(0.003)
Other household income	0.019***	(0.002)	0.004E-02***	(0.000)	0.006***	(0.001)
Household size	-7.933***	(2.819)	-0.015***	(0.005)	-2.695***	(0.958)
Responsible for children $\leq$ 16yrs	14.1774	(8.904)	0.027	(0.017)	4.817	(3.025)
[a]Home ownership:						
Owner mortgage	-28.091***	(7.107)	-0.053***	(0.014)	-9.675***	(2.482)
Rented	-11.124	(11.230)	-0.021	(0.021)	-3.746	(3.748)
[b]Future Financial status expectation:						
Better than now	-11.604***	(4.294)	-0.022***	(0.008)	-3.925***	(1.446)
Worse than now	9.284	(5.158)	0.018	(0.010)	3.188	(1.790)
Employer pension provision	14.557***	(5.928)	0.028***	(0.011)	4.943***	(2.012)
[c]***Fairness of wealth distribution:***						
Disagree	10.058**	(5.096)	0.019**	(0.010)	3.416**	(1.730)
Neither Agree/Disagree	22.972***	(6.746)	0.044***	(0.013)	7.958***	(2.384)
Agree	19.108**	(8.278)	0.036**	(0.016)	6.626**	(2.929)
Log likelihood						-83,036.256
Number of observations [individuals]						22,433 [10,220]
Number of uncensored observations						11,474
Sigma u						162.598

Notes: (1) ***, **, * denotes significance at the 1% level, 5% level, and the 10% level respectively. (2) Standard errors are in parenthesis. (3) Marital Status, Health Status year dummies , and the average of all the explanatory variables are included. (4) Omitted categories: (a) Owner outright, (b) About the same, (c) Strongly disagree.

Table 4.A3: The probability of saving a positive amount out of monthly income

Correlated Random Effects Probit estimates

Monthly Savings		
Age	-0.054***	(0.020)
Age squared/100	0.074***	(0.023)
Net monthly labour income	0.036E-02***	(0.005E-02)
Non-labour income	0.002E-02	(0.006E-02)
Other household income	0.011E-02***	(0.002E-02)
Household size	-0.080***	(0.022)
Responsible for children $\leq$ 16yrs	0.153**	(0.069)
[a]Home ownership:		
Owner mortgage	-0.004	(0.056)
Rented	-0.005	(0.087)
[b]Future Financial status expectation:		
Better than now	-0.118***	(0.033)
Worse than now	-0.019	(0.040)
Employer pension provision	0.190***	(0.045)
[c]***Fairness of wealth distribution:***		
Disagree	0.060	(0.038)
Neither Agree/Disagree	0.173***	(0.052)
Agree	0.106*	(0.065)
Prob > F		0.000
Log Likelihood		13,772.699
Number of observations [individuals]		22,400 [10,213]

Notes: (1) ***, **, * denotes significance at the 1% level, 5% level, and the 10% level respectively. (2) Standard errors are in parenthesis. (3)Marital Status, Health Status and year dummies are included. (4) Omitted categories: (a) Owner, (b) Stay the same, (c) Strongly disagree.

Table 4.A4: Impact of fairness perceptions of the wealth distribution on monthly savings *Pooled Tobit estimates with robust standard errors*

Monthly Savings	Coefficient		Pr(savings>0)		E(savings|savings>0)	
Age	-1.101	(1.162)	-0.002	(0.003)	-0.387	(0.409)
Age squared/100	0.164	(1.467)	0.037E-02	(0.003)	0.058***	(0.516)
Net monthly labour income	0.088***	(0.011)	0.020E-02***	(0.002E-02)	0.031***	(0.004)
Non-labour income	0.050**	(0.026)	0.011E-02**	(0.006E-02)	0.018**	(0.009)
Other household income	0.025***	(0.002)	0.006E-02***	(0.000)	0.009***	(0.001)
Household size	-24.264***	(1.352)	-0.054***	(0.003)	-8.532***	(0.472)
Responsible for children $\leq$ 16yrs	1.404	(6.311)	0.003	(0.014)	0.494	(2.219)
[a]Home ownership:						
Owner mortgage	-53.429***	(5.318)	-0.118***	(0.012)	-19.376***	(2.011)
Rented	-74.243***	(5.517)	-0.162***	(0.011)	-24.410	(1.696)
[b]Future Financial status expectation:						
Better than now	-15.916***	(3.125)	-0.035***	(0.007)	-5.557***	(1.088)
Worse than now	2.149	(4.720)	0.005	(0.010)	0.758	(1.669)
Employer pension provision	37.982***	(4.009)	0.084***	(0.009)	13.335***	(1.386)
[c]*Fairness of wealth distribution:*						
Disagree	16.465***	(4.084)	0.037***	(0.009)	5.784***	(1.434)
Neither Agree/Disagree	30.716***	(4.704)	0.068***	(0.010)	11.134***	(1.756)
Agree	37.877***	(5.454)	0.084***	(0.012)	13.964***	(2.099)
Log likelihood						-82,489.839
Number of observations [individuals]						22,400 [10,220]
Number of uncensored observations						11,441
Sigma u						179.332

Notes: (1) ***, **, * denotes significance at the 1% level, 5% level, and the 10% level respectively. (2) Standard errors are in parenthesis. (3) Marital Status, Health Status year dummies , and the average of all the explanatory variables are included. (4) Omitted categories: (a) Owner outright, (b) About the same, (c) Strongly disagree.

Chapter 5

Conclusion

5.1 Fairness considerations affect marginal choices

Economics prides itself on its parsimonious approach to modelling individual behaviour. This has allowed economists to make uncomplicated and powerful predictions vis-à-vis economic outcomes. Nevertheless, it has become increasingly obvious that the standard model, upon which most economic theories are predicated, is not able to explain significant portions of entrenched economic behaviour, which are misleadingly, perhaps cleverly classed as 'anomalies'. The standard model assumes that individuals are ultimately motivated purely by selfish desires. Therein lies one of the reasons why economists seem unable to adequately explain these anomalies. Unfortunately, economists have traditionally shied away from devoting much attention to non-pecuniary factors in behavioural models and likewise from using subjective data in empirical analyses. This trepidation appears to have hindered economists from attaining a more wholesome understanding of individual behaviour and has hence, reduced the effectiveness of policies.

Recently, a healthy trend towards incorporating non-pecuniary concerns into economic models has emerged to address the limitations of the standard model and to enable economists to design more effective policies. At the heart of these studies is the assertion that non-pecuniary concerns enter individuals' utility functions and in turn affect marginal outcomes. It has been proposed that non-pecuniary concerns give rise to emotions that motivate individuals to act in ways that are not

always consistent with predictions from the standard model but which nonetheless have decisive consequences for economic outcomes. The theoretical literature on this issue has been at the forefront of highlighting the importance of the particular role of fairness considerations in generating economic outcomes. However, the corresponding empirical literature is far from voluminous and most are of the experimental type. As such, there is a lacuna in the literature where non-experimental econometric analysis is concerned. This situation exists partly because the use of subjective data, which seems essential in studying the role of non-pecuniary concerns, has until recently been unpopular, and this has been compounded by the limited availability of appropriate data.

Following in the footsteps of past studies that prove that fairness considerations have important consequences for a wide range of economic behaviour including, among others, effort choice and cooperative behaviour, the research undertaken in this thesis yielded additional insights into the microeconomic implications of fairness concerns. It provided further evidence that the impact of fairness considerations on economic behaviour is not simply a theoretical artefact. In addition, it provided supporting evidence for the findings from experimental research. Broadly speaking, the thesis established that, for some economic behaviour, fairness considerations are likely to meaningfully affect marginal outcomes and as a result, economists should incorporate fairness concerns in the theoretical and empirical

analyses of individual behaviour.

Instrumental in the contributions of this thesis is the use of good data sets and rigorous empirical analyses. Each chapter presented econometric evidence on the implications of the fairness of outcomes for economic behaviour. The determinants of fairness-of-pay perceptions were explored and it was revealed that the nature of the relationships between these determinants and fairness-of-pay perceptions are not always in line with the expectations based on labour market theories that often do not account for non-pecuniary concerns. It was further demonstrated that individual labour supply and private savings are affected by distributional concerns for fairness.

5.2 A review of the results

Chapter 2 was primarily concerned with identifying the factors that shape fairness perceptions of pay. It is submitted as the first known attempt to estimate fairness perceptions of pay equations for United Kingdom employees. Emphasis was placed on the role of key demographic factors, namely gender, race and age and on the role of an assumed measure of the comparison wage. The analysis further sought to ascertain whether these perceptions are consistent with established labour market assertions.

What seems remarkable is that even after controlling for wages, demographic characteristics still mattered significantly in the determination of fairness perceptions of pay. For instance, based on the results, two individuals with identical characteristics who are paid the same wage but differ only by gender or by race can be expected to hold different perceptions of how fairly they are paid. More specifically, the findings suggest that in comparison to male employees with similar characteristics, female employees are more likely to perceive their pay as fair. This is surprising given the existence of gender pay discrimination in today's labour market. The results also revealed that, consistent with labour market theory and evidence, non-white employees are more likely than white employees to perceived their wage as unfair. In addition, an employee's age appeared to be important in influencing fairness perceptions of pay. It was found that as individuals grow older, their fairness perception of their pay becomes less favourable.

It is not obvious why female employees' perceptions of pay are at odds with the existence of a pay gap. It might be that women are either unaware of the pay discrimination or they have perhaps become inured to the gap. Cultural and other sociological factors may also be responsible for the difference in the fairness-of-pay perceptions of male and female employees. For example, men are sometimes thought to be more competitive than women and thus may be more likely to feel disgruntled about their pay. It is also possible that women may believe that men

possess certain innate characteristics that deserve a premium in the labour market.

The implication of this finding is that if effort choice is linked to perceptions of pay as have been proposed, then, *ceteris paribus*, with more favourable perceptions of pay, women are more likely to exert greater effort than men. In other words, for any given wage, female employees would be more productive than their male counterparts. It follows that firms could increase their profitability if they increase the number of female employees. However, from a policy point of view, female employees should be made more aware of the extent of the pay discrimination. Perhaps there should be an improvement and an increase in the means, such as greater transparency, by which women could recognise when they are unfairly treated.

The results also implied that, regardless of the pay awarded, ethnic minorities will still feel 'hard done by'. A reason offered for this is that the continued existence of discrimination in the labour market may cause minorities to be suspicious and hence more predisposed to believing that they are unfairly paid even though this may not be correct. As a consequence, non-white employees may be unwilling to exercise much diligence at work. This may send an adverse signal to employers who may then perceive non-white employees as being characteristically less productive than white employees. In short, the comparatively unfavourable fairness-of-pay perceptions of non-white workers may encourage behaviour which

help perpetuate the bias against them. Perhaps greater transparency with wages and the dismantling of any 'institutional' racism may help curb this problem.

Curiously, it was found that a comparison wage based on age and occupation did not play a significant role in the determination of fairness-of-pay perceptions. It could be that individuals do not use such a comparison wage when considering how fairly they are paid. However, this remains a puzzle for future research to explore.

While Chapter 2 looked at the determinants of the fairness perceptions of one particular outcome, Chapter 3 and Chapter 4 proceeded further to provide evidence of the role of fairness perceptions of an outcome as an important driving force behind economic behaviour. It was made clear from these two chapters that for policy makers to be successful in achieving the intended change in individuals' behaviour, it is necessary that they take into consideration the possible behaviouristic role of fairness perceptions of economic outcomes and the possibility that these perceptions may not always be consistent with the constructed statistical measures of these outcomes.

In Chapter 3, it was revealed that individuals' distributional concern for fairness significantly influences their labour supply. A theoretical model was developed to show how the distribution of wealth might affect the number of weekly hours

worked. The model rests on the premise that when the norm of fairness is violated, individuals suffer cognitive dissonance and a consequent loss of utility. Therefore, utility maximising individuals will seek to reduce this loss by bringing about a more fair outcome. An important assumption was that individuals allocate their time between leisure, labour marker work, and voluntary work. It was hypothesised that when wealth is unfairly distributed in society, individuals react by engaging in fairness-increasing activities, such as voluntary work, in an attempt to help those who are adversely affected. Hence, there will be less time available for labour-market work.

The empirical analysis focused on male employees. A key aspect of the analysis was that rather than employing a constructed measure of the wealth distribution, *perceptions* of how fairly wealth is distributed were used since they were considered more crucial in motivating behaviour. It was found that as fairness perceptions of the distribution of wealth became more favourable, male employees increased the number of hours worked. This result supported the theoretical conjecture that individuals may reduce labour market time to participate in voluntary work.

The evidence further revealed that the positive relationship between fairness perceptions of the wealth distribution and labour supply is strongest for unmarried male employees. In addition, the changes in the number of hours of work for unmarried male employees were found to be more than double that of the average

male employee. It was surmised from the findings that unmarried male employees are probably more flexible in dividing their time than married male employees.

Given the role of labour supply in determining economic activity and hence economic growth, it is important that policymakers recognise and address the influence of perceptions of the distribution of wealth on individuals' labour supply decisions. In other words, policymakers should strive to achieve greater equality in the distribution of wealth and to find ways to make this visible and at the same time encourage individuals' perceptions to be accordingly revised. Indeed, some claim that should the government fulfil its obligations to create a more equal society, they would not feel the need to engage in voluntary work.

The impact of individuals' fairness perceptions of the wealth distribution on the amount that is saved out of monthly income was the subject of the investigation in Chapter 4. Using a simple theoretical model, it was argued that changes in how fairly wealth is distributed can lead to changes in individuals' motivations to save and hence in the amount that is saved. As in Chapter 3, part of the innovation of the chapter was to use *perceptions* of how fairly wealth is distributed since, as was mentioned before, they are deemed to be more influential in directing behaviour than some constructed measure of the wealth distribution.

Based on empirical analysis, it was determined that fairness perceptions of the

wealth distribution significantly affect individuals' monthly savings out of income. In general, it was found that fairness perceptions of the wealth distribution are positively correlated with monthly savings. On average, as perceptions of how fairly wealth is distributed become less favourable people save less. To explain this relationship, it was reasoned that an unfair wealth distribution may increase competitive behaviour as individuals seek to improve their status and move up the social ladder. As such, they are likely to engage in conspicuous consumption, with a consequent fall in the amount saved.

Delving deeper to discover whether the effect of fairness perceptions of the wealth distribution on savings varies for different groups of individuals, it was found that except for non-white employees, the positive relationship remained robust. Non-white employees appeared to increase monthly savings as perceptions of the wealth distribution became more unfavourable. The main intuition offered for this was that an unfair wealth distribution may engender greater anxiety and caution among non-white individuals, and as a result they may endeavour to spend less in order to mitigate against any future decline in their economic position. In this sense, they appear to be more concerned about improving future economic status. Another plausible explanation put forward was that as wealth becomes more unfairly distributed, non-white individuals may choose not to engage in conspicuous consumption in order to avoid being the victims of envious neighbours.

The chapter proposed that to help stem the existing unhealthy trend towards low savings, which threatens to undermine future economic growth and the standard of living of individuals during retirement years, more effective policies require the acknowledgement of the possible behavioural effects of individuals' distributional concerns for fairness.

As part of all the empirical analyses in the thesis, the common problems of endogeneity and individual heterogeneity were addressed and several additional robustness checks were carried out to determine the veracity of the findings.

5.3 Directions for future research

The various studies undertaken in this thesis have attempted to provide evidence of the importance of fairness perceptions in driving economic behaviour. However, the combined research is not exhaustive. Some potential directions for future research which were borne out from the analyses in the thesis are briefly mentioned below.

Firstly, it seems important that future research seek to ascertain how far the findings in Chapters 2, 3, and 4 can be generalised. It is interesting as well as necessary to determine whether the results remain robust when different data sets for the United Kingdom are used. Moreover, it is worthwhile exploring whether the relationships discovered are consistent across countries.

Another prospect for future research, which emerges from Chapter 1, is the need for better data on individuals' fairness perceptions of pay. Although the measure employed in the chapter is assumed to reflect individuals' opinions on how fairly they are paid, it faces the problem that the question on which it is based does not explicitly use the word fair or fairness. Obtaining a more direct measure would improve the analysis. The study can be further developed to investigate how individuals' fairness-of-pay perceptions affect effort levels, the decision to quit, and similar labour market choices. Currently, though there are many theoretical discussions on these issues, there are very few accompanying econometric studies that use direct measures of fairness perceptions.

Chapter 3 would have benefited from having useable data on the time individuals spend engaged in voluntary activities. This would have made it possible to determine whether individuals reduce labour market time in favour of more voluntary work or leisure. This presents an opportunity for future research.

With regards to Chapter 4, there is room to extend the analysis to assess how sensitive the results are to other measures of savings. It is possible that different conclusions are arrived at when boarder measures of savings are employed. Furthermore, the various components of a broader measure of savings may be affected differentially.

In addition, the analyses in Chapter 3 and Chapter 4 can be developed further by conducting an investigation into the differences between the impact of individuals' perceptions of how fairly wealth is distributed and a statistical measure of the wealth distribution. Such a valuable investigation could reveal the extent and consequences of possible departures and further underline the need to incorporate fairness perceptions in microeconomic analyses.

Finally, more general and extensive theoretical models are needed to help explain how distributional concerns for fairness affect individual behaviour. Previous theoretical studies have concentrated solely on the changes in individuals' economic behaviour when they violate the norm of fairness or when they are the direct targets of unfairness. These models are needed to provide solid theoretical premises that will enable useful economic interpretations of the results.